MODEL AIRPLANE NEWS

APRIL 1943
TWENTY CENTS

DE HAVILLAND MOSQUITO BOMBER

FLASH NEWS

THE Army Air Forces has terminated its glider program and cancelled production orders to a dozen glider-builders. This news, coming as a surprise to many, is not a change in the Army's tactical program which has achieved considerable success in the operation of glider trains as invasion troop carriers, but rather in protest to the poor design and equally poor construction of those gliders being purchased under the program's financial allotment. Some Air Forces spokesmen have stated that gliders and glider-troop-trains are more trouble than they are worth and are a particularly expensive method of waging war. Although Germany achieved considerable success with their glider offensive on the comparatively undefended island of Crete, the dropping of men and equipment in gliders behind strongly fortified and heavily-manned enemy lines seems tactically illogical in the light of the expense in man-power. In order to succeed, a glider attack must be undertaken on a large scale in order for enough manpower and equipment to be concentrated behind the enemy's fortifications to constitute a genuine threat in his rear. Once down, the glider, its men and equipment are a total loss unless they can quickly organize an offensive and be hurriedly relieved by attacking troops. And such an action cannot be depended on when the enemy is large, strong and alert.

Howard Hughes will shortly announce plans for a post-war international airline which will transcend even the most ambitious program yet publicized. He has not yet disappointed aviation and he has many, many things backing up his plans: his giant flyingboats building partnership with Henry Kaiser, majority stockholding interest in T.W.A., own present 'Round-the-World flight record, aircraft engineering and production background and his large personal fortune.

The Government has taken a very active interest in post-war aviation long-range planning and at the personal request of President Roosevelt a committee has been formed to study the many problems involved. The State Department has assumed control of the group, indicating diplomatic international questions may be involved. Chairman of the group is Adolph A. Berle, Jr., Assist. Secretary of State, and the committee is made up of Robert A. Lovett, Assist. Secretary of War for Air; Artemus Gates, Assist. Secretary of Navy for Air; Wayne Chatfield Taylor, Under-Secretary of Commerce, and L. Welch Pogue, Chairman of the Civil Aeronautics Board.

The miraculous victory of General Sir Bernard Law Montgomery over Field-marshal Erwin Rommel, during which he chased the enemy 1300 miles from Alexandria into Tripoli, will most assuredly go down in history as one of the most amazing feats of modern military history. (It was actually the longest chase in all history!) And it was made possible largely through airpower, it was recently revealed. British sources have released certain details of the role airpower played in the mountainous problem of supplying the entire British Eighth Army moving at the rate of 100 miles per week, with all of its requirements. Lockheed Hudson bombers, assuming the brunt of the transport work, maintained a constant sky train between Alexandria and the advancing Montgomery and on frequent occasions succeeded in landing behind the enemy's line with complete fighter base equipment. The Hurricanes and Tomahawks were then flown in and began operation against Rommel's rear at close range. The African campaign now moves into its final and, undoubtedly, most desperate stage and, at the present writing, the largest land and air-battle of the war is in prospect as the Nazis attempt to escape to Italy.

The United States Marines have surrendered Guadalcanal. No, not to the Japs but to the United States Army, which has relieved them. Having fought, and won, one of the most bitterly contested Pacific areas of the war, the Marines, under Major-General A. A. Vandegrift, have withdrawn for a well-earned rest, leaving a safe, well-kept and strategic Henderson Field for the Army's Aircobras and Lightnings. Major General A. M. Patch has taken command of the Army forces there who have succeeded in flanking the Japs at Cape Esperance and are attempting to force them from the Island. Such a move would clear the way for the landing and basing of a heavy-bombardment force preparatory for a large-scale attack upon Rabaul, Jap stronghold.

Captain Edward V. Rickenbacker is now touring the nation's war plants in a drive to increase production through battling absenteeism. "There is no absenteeism in the foxholes of the Pacific," he states. "If you could see what I have seen out there, what those boys are going through, going days without food or fresh water, sleeping in holes filled with slime to their knees, there would be no question in your mind about how much there is to be done here on the assembly lines, about whether or not you feel like going to work, or about whether or not these tools of war are being properly used." Only partially recovered from his grueling 22-day exposure on a tiny raft in the South Pacific, "Rick" is nevertheless working day and night to spur war production. His co-pilot on the flight, Lt. James C. Whitaker, is accompanying him.

Lt.-Colonel Elliot Roosevelt, commander of a reconnaissance squadron in

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14TH YEAR OF PUBLICATION

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Edited by
Charles Hampson Grant

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"Model Building is the wise thing for any boy to do,

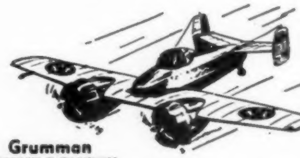
writes Flight Instructor S.B.F., Chapel Hill, N.C.

Read what else he says: "I've been building model airplanes for about 8 years now, but have not had much time lately to devote to it, as I am now a Flight Instructor, and have 5 Navy Cadets to fly with every day. The majority of these students have built models before, and praise Cleveland (Continued next page)

AN AVIATION MILESTONE DESIGN C-D

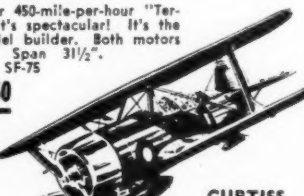
MESSERSCHMITT ME-109

Germany's mass production fighter. In action wherever Nazis are fighting. Model Span is 24½". C-D Master Kit SF-74.... $3.00



Grumman "SKYROCKET"

America's twin motor 450-mile-per-hour "Terror of the Skies." It's spectacular! It's the envy of every model builder. Both motors pull—and how. Span 31½". C-D Master Kit SF-75 $3.50



CURTISS SBC "HELL-DIVER"

Navy's famous scout dive bomber, capable of blasting war vessels with either a 500 or 700 lb. bomb, mounted under fuselage. Span 25½" C-D Master Kit SF-80... $3.50

It's "Tops" in the U. S. Navy

VOUGHT-SIKORSKY "CORSAIR"

Claimed to be the fastest standard single engine plane in the world by the U. S. Navy, estimated to do nearly 500 m.p.h. Span 30 3/16". C-D "Master" Kit SF-79........ $3.50

The World's Hardest-Hitting Dive Bomber

Douglas SBD "DAUNTLESS"

Has a speed of around 300 m.p.h. carrying a 500 lb. bomb beneath fuselage. Also widely used as a scout. Delivering heavy damage against the enemy. Span 30⅝". C-D Master Kit SF-89, $3.50

Republic P-47 "THUNDERBOLT"

The "Flying Battleship" with tremendous fire power. A speed of over 425 m.p.h. and a 40,000 ft. ceiling. One of our greatest fighters Span is 30¾". C-D Master Kit SF-81... $4.00

Read These Letters from "Men in the Air Forces"

★ ★ ★

"As a flight instructor at an Army Primary School, I am continually reminded of the value of model-building in my work. Modelbuilding has given me an understanding of basic aerodynamic principles that facilitates a simple and clear explanation of them to my students."

Instructor R. B. H.
Air Corps, Tr. Det.
Oklahoma.

★ ★ ★

"I am now flying a P-47, and in my branch of the service identification is of vital importance, therefore, I recommend model construction as the best method to become familiar with the many types of planes. Having built models since 1927, I find that experience has repaid me in many ways, especially in the Air Corps training course."

Lt. L. F. R.
Westover Field, Mass.

★ ★ ★

"My 13 years of model building has helped me immeasurably in winning my wings. I have been instructing at an advanced training school for over a year, and by using a model on the ground to demonstrate aerobatics, etc., I save air time, my voice and the government's gas."

Flying Officer H.R.W.
RCAF, Aylmer, Ont.

LOCKHEED P-38 "LIGHTNING"

A super powered, twin motored job, so fast that you don't hear it till it has passed. Ideal for intercepting bombers because of its high ceiling, and terrific diving power. Span 38¾". C-D Master Kit SF-85.... $4.00

Brewster "BUFFALO"

Highly maneuverable and fast. Climbs 4,000 ft. per minute. Speeds around 350 m.p.h. Has exceptional cruising range. Also used by British and Dutch. Former nicknamed it "Peanut Special." Span 26¼". C-D Master Kit SF-87.......... $3.00

Hawker "HURRICANE"

England's great night fighter. Employs 8 mounted machine guns with 10,000 rounds per minute firing power—or four 20 m.m. cannons. Our drawings show both types; also air scoop employed in African desert fighting. Model Span is 30". C-D Master Kit SF-78.................. $3.00

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When You Build **CLEVELAND**

that Pilots, Bombardiers, Instructors, Cadets-in-Training

if he intends taking up Aviation in any branch"

Kits very highly. Before each flight I make with the student, I demonstrate each maneuver we are to do with one of my 'pet Cleveland Models' which like all Cleveland Models has movable controls. These boys, like myself, have found that building model planes has gone a long way toward helping them in their flying career. I have just about all your warplanes now, and am working on the P-39 at present."

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PLAYBOY SR. Class C Gas. Huge 80" span. Breaking records everywhere. 800 sq. in. Kit GP-5017 (except motor unit) **$4.95**

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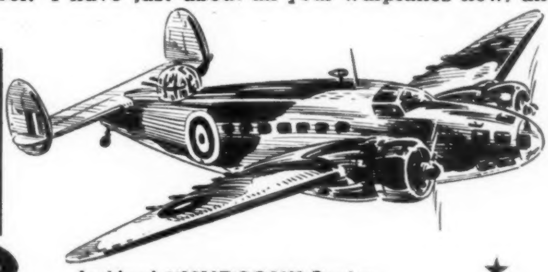


Lockheed "HUDSON" Bomber

Called "Old Boomerang" by the British, for it always seems to come back. A powerful bomber, also used for reconnaissance and has done some fighting, too. Has seen plenty of action over Europe, Africa and the wide stretches of the Pacific. Span is 49⅜". C-D Master Kit SF-95 **$7.50**

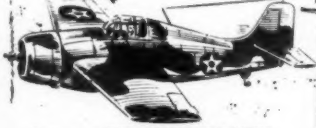
"Cleveland Models Win More Prizes, More Honors, More Compliments Than Any Other Line of Models in the World"

North American P-51 "MUSTANG"

A tough, vicious fighter that is today very much in the news for the spectacular fighting it is doing. Known as the P-51 "Apache," but rechristened "Mustang" by the British. Flies over 350 m.p.h. Resembles Messerschmitt ME-109e, but more refined in its lines. Sports at least 6 flush mounted machine guns. Span 27 3/16". C-D Master Kit SF-91. **$3.00**

BELL "AIRACOBRA"

The swift flying "cannon plane" that stings with the deadliness of a cobra. Doing great work over the Solomons. Model has beautiful streamline grace of prototype and cuts through the air with a knifelike flight. Span is 25½". C-D Master Kit SF-76 **$3.00**



Grumman F4F "WILDCAT"

An excellent U.S. Navy Shipboard and Marine fighter. Lives up to its name—in the case, for instance, where one of our men downed 5 Jap bombers in 5 minutes. Very maneuverable. Has a speed of 325 m.p.h. Model Span is 26¼". C-D Master Kit SF-83 **$3.00**

Nazi DIVE BOMBER
JUNKERS JU-87 STUKA

One of the Nazis' greatest weapons for terrorizing and wreaking heavy destruction upon Europe. Span is 34". C-D Master Kit SF-84 **$3.50**

Two Biggest Planes "for the Money" in the U. S.

New Redesigned Super CONDOR SOARER

Stronger, longer flights, more graceful lines, construction simplified. Easier than ever to build. Huge 7 ft. wingspan. You can't get a better design for learning principles of advanced soaring flight. Kit VE-5019 **$1.00**

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Longer lasting. Beautiful flights. Big 4 ft. wingspan. Patterned after "Baby Bowlus." Easily Built. Kit VE-5018 **50¢**

Curtiss P-40 "TOMAHAWK"

Making history everywhere it takes to the air. Span 28⅛". Camouflage instructions included. C-D Master Kit SF-77 **$3.00**

British "SPITFIRE"

Pride of the R.A.F., Fast, maneuverable and a deadly interceptor-fighter. Span is 27⅝". C-D Master Kit SF-73 **$3.00**

More Letters from "Men in the Air Forces"

★ ★ ★

"I joined the ARF when I was just 18. I felt then I was out of place in an arm of the Service with men whose age average is 22 or 23. Imagine my surprise when they came to me for aid in structure, theory of flight, wing design and identification of aircraft. It was all 'new stuff' to them, but commonplace to me because of my model building background.

A/C B. M.
Nashville, Tenn.

★ ★ ★

"I have been in the U.S. Navy a little over six years now and am sure that my modelbuilding experience has helped me attain my present rating of Aviation Chief Metalsmith, as in the examinations we take for advancement we are required to know much about aircraft structures, flight terms, and aircraft nomenclature. These have become second nature to me now and consequently I am able to concentrate on subjects which are required to be known also, but which model building does not cover.

"The first Cleveland Kit I bought was a ¾" scale model of a Monocoupe. It flew wonderfully too. That was in 1932.

"In closing permit me to say that every chance I get I talk to the men who are working for me repairing the many types of planes now in use by the Navy that if they want to get ahead faster to get into modelbuilding.

B. A. S., ACM, U.S.N.
Florida

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SE KEEPS 'EM FLYING!

SE is not a direction—it means Squadron Engineer, the man who is the mainspring of our airpower. His work on the ground is the prelude to Victory

by ROBERT McLARREN

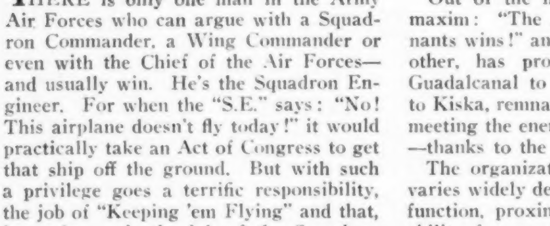
THERE is only one man in the Army Air Forces who can argue with a Squadron Commander, a Wing Commander or even with the Chief of the Air Forces—and usually win. He's the Squadron Engineer. For when the "S.E." says: "No! This airplane doesn't fly today!" it would practically take an Act of Congress to get that ship off the ground. But with such a privilege goes a terrific responsibility, the job of "Keeping 'em Flying" and that, in a phrase, is the job of the Squadron Engineer.

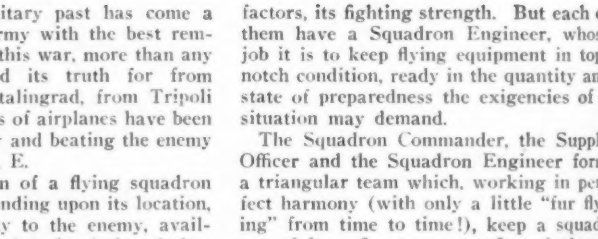
Out of the military past has come a maxim: "The Army with the best remnants wins!" and this war, more than any other, has proved its truth for from Guadalcanal to Stalingrad, from Tripoli to Kiska, remnants of airplanes have been meeting the enemy and beating the enemy—thanks to the S. E.

The organization of a flying squadron varies widely depending upon its location, function, proximity to the enemy, availability for supply, length of time it has been in service and, among many other factors, its fighting strength. But each of them have a Squadron Engineer, whose job it is to keep flying equipment in top-notch condition, ready in the quantity and state of preparedness the exigencies of a situation may demand.

The Squadron Commander, the Supply Officer and the Squadron Engineer form a triangular team which, working in perfect harmony (with only a little "fur flying" from time to time!), keep a squadron of from five to twenty-five airplanes in flying condition. It is the duty of the

Above Removing a wing from a badly damaged plane in New Guinea to replace a damaged wing on another plane. *Below Left* A pilot rushes to his plane while his mechanic starts the motors for a hurried takeoff. *Below Right* Mechanics inspect a P-39 after its return from combat





Supply Officer to make available the fuel, oil, ammunition and spare parts, the Squadron Engineer to see that these things are economically used and that all parts of the airplane are kept in working order and the Squadron Commander to see that men and machines are used to the best advantage in the air.

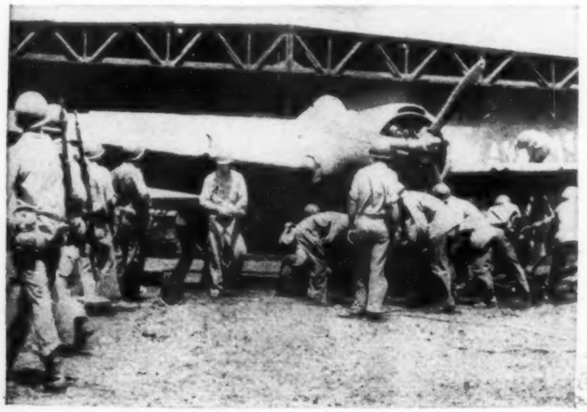
Chief headache of the S.E. is the enemy, who makes every attempt to put him out of business by continually damaging the airplanes he has so patiently labored to keep fit. But many C.O.'s will tell you that without the Engineer the stories of their aerial campaigns might have had far different versions.

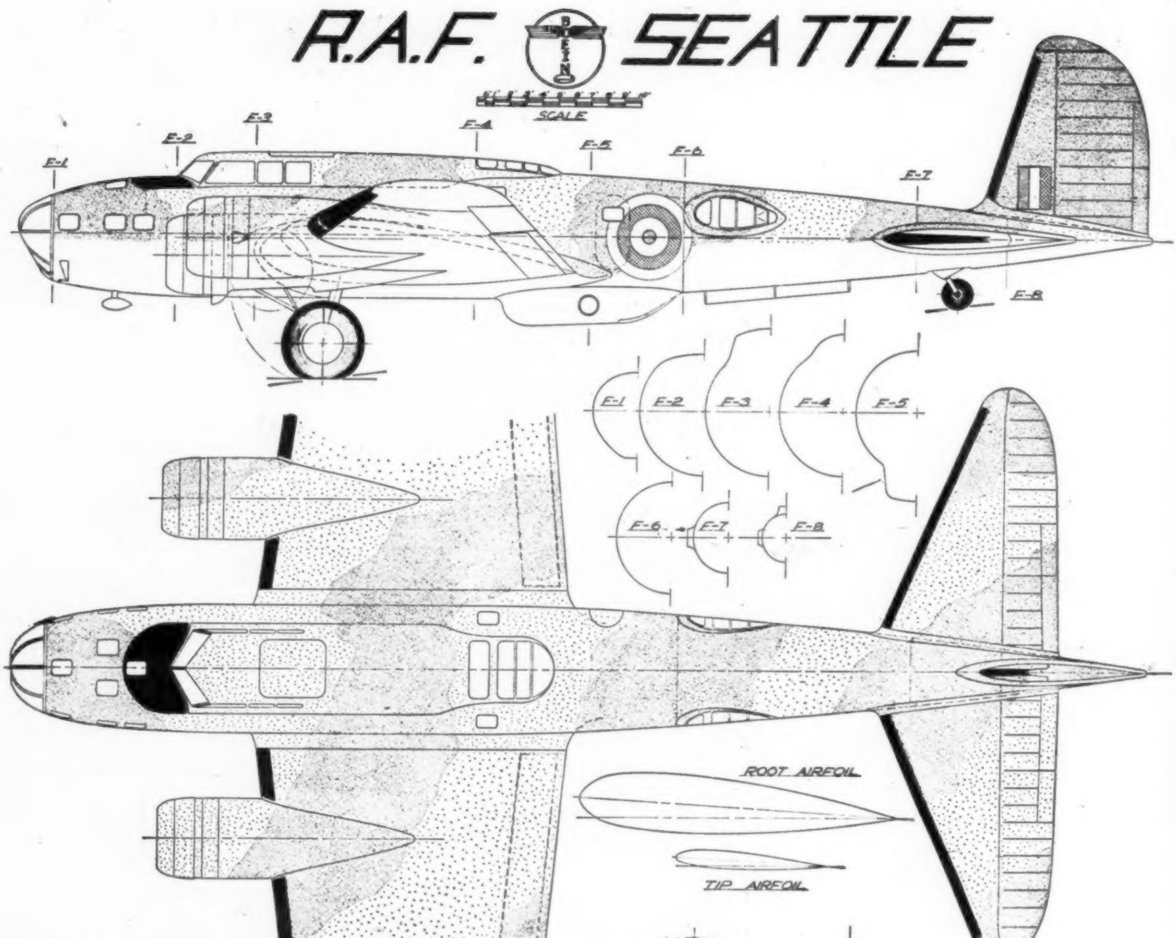
The Squadron Engineer's work begins the first day a new airplane arrives at the field. He receives it from the Ferry pilot and certifies to the Supply Officer that it is in good condition. Then he checks it into the squadron records, prepares different forms which will keep a running check on the plane throughout its life, or until it is transferred to another operating organization, assigns from one to five mechanics to it (depending upon the plane's size and complexity) and, finally, signs it out to the pilot to whom the C.O. has issued the craft. The S.E.'s primary job is inspection of that airplane. Army Air Forces airplanes, be they light primary trainers or giant Flying Fortresses, are closely inspected at frequent intervals, complete records are kept and its exact status is known at any given instant.

Most frequent inspection is the "Pre-Flight," a complete visual check of the airplane prior to the first flight of the day. This inspection covers, briefly, servicing the airplane with fuel, oil, ammunition and/or bombs and (in the case of Allison-powered planes) engine coolant fluid. Windshields and glass panels are polished, cockpit is thoroughly cleaned out and checked for loose items which might shift

(Continued on page 42)

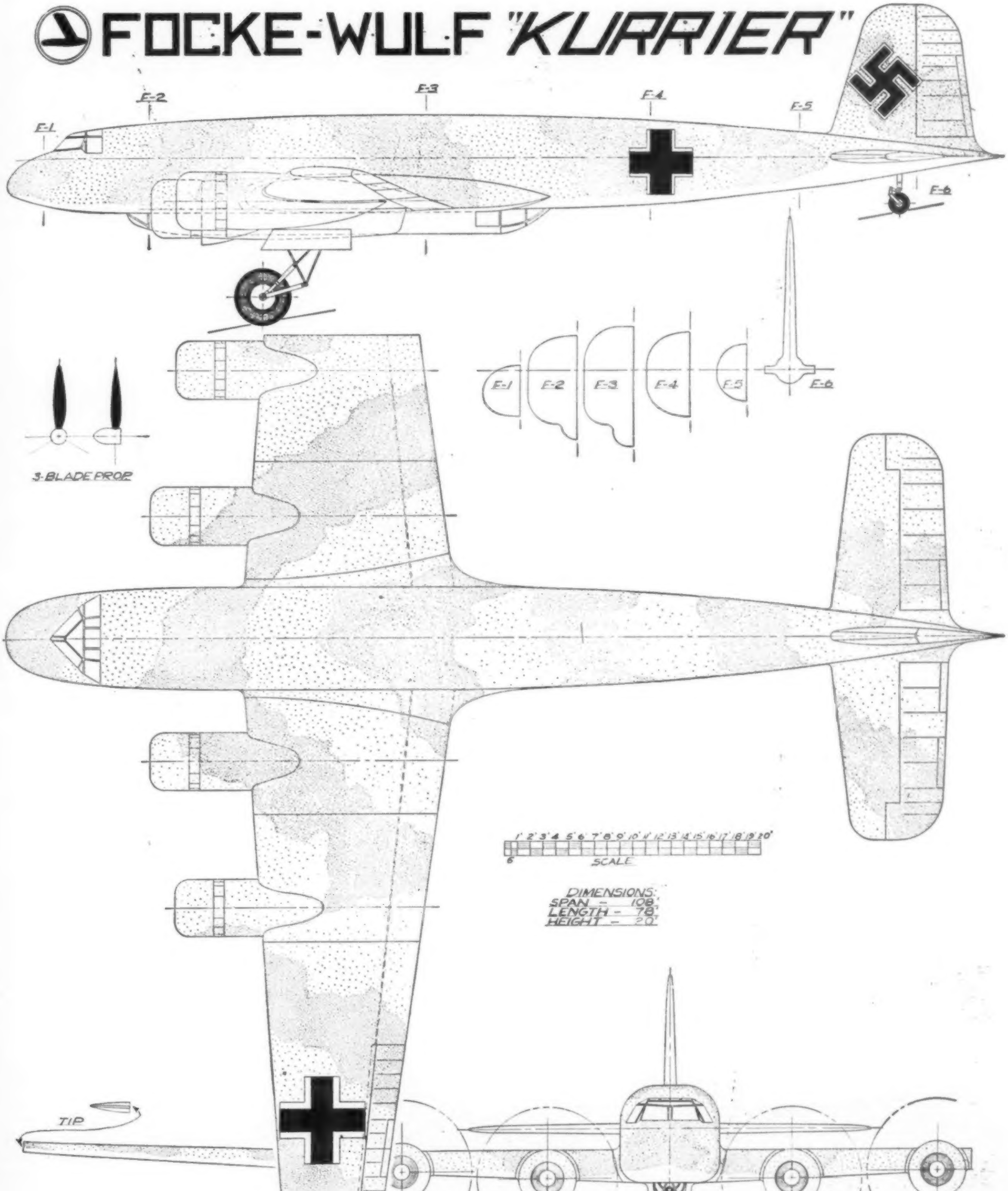
Top Right **P-39 fighters take off from a New Guinea airbase on a Jap destroying mission. Note other types on the ground.** *2nd* **A service crew gives a P-38 a "going over" before a takeoff.** *Right* **A P-38 starts on a flight. Note metal grill-work laid to provide a smooth hard runway.** *Below* **Marines salvage a Grumman Wildcat from a bombed hangar on Guadalcanal.** *Below Right* **Mechanics servicing a B-17 landing gear in the South Pacific**





R.A.F. SEATTLE
BOEING
SCALE
F-1
F-2
F-3
F-4
F-5
F-6
F-7
F-8
ROOT AIRFOIL
TIP AIRFOIL
(4) 3-BLADE
11'6" HYDROMATIC
PROPELLERS
SPECIFICATIONS:
SPAN - 103' 9.37"
LENGTH - 67' 10.56"
HEIGHT - 15' 4.5"
EMPTY WT. - 31,150 LBS.
USEFUL LOAD - 16,350 LBS.
GROSS WT. - 47,500 LBS.
FUEL - 1,700 GALS.
OIL - 180 GALS.
PERFORMANCE:
MAXIMUM SPEED - 325 M.P.H.
SERVICE CEILING - 36,700 FT.
RATE OF CLIMB - 2,260 FT./MIN.
MAXIMUM RANGE - 3,500 MI.
ENGINES - WRIGHT CYCLONE
R-1820-G66C (4) 1200 H.P.
DRAWN BY J. B. RUST

FOCKE-WULF "KURRIER"



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LESSON 10

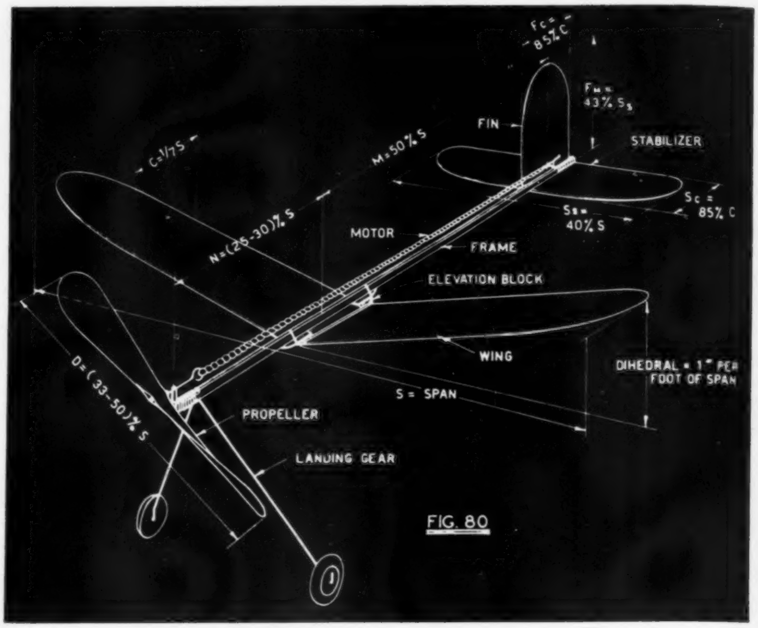


FIG. 80

WHEN scientists first tried to solve the problem of flight, no information on flight principles was available for reference: they had to start "from scratch" by experimenting with all types of weird models in order to establish basic flight laws. Only when these basic laws were determined was it possible to construct a successful flying machine. Experiment was then and always will be the road from the past to the future, from ignorance to knowledge. It is the means of demonstrating ideas, proving theories, and inspiring greater understanding of scientific laws.

Books can never become a substitute for experiment. They merely relate an author's interpretation and do not demonstrate the sequence of actions and reactions. But experimenting provides demonstration and exposition of basic flight laws; a means of applying ideas and observing their results.

Degree of variation in lift, climb, speed, etc. can be noted with changes in plane proportions, shape or size. The only limit to knowledge gained is the inability of the experimenter to perceive; however this quality expands with time and experience.

Books provide invaluable information about airplanes but experiment teaches how to apply flight laws to obtain practical results as well, and results must be the objective if an undertaking is to be successful.

So rather than merely explain the principles of flight, a series of experiments with airplanes of various proportions will be carried out here to give complete and practical understanding of flight laws and airplane design.

Before starting to experiment however, the meaning and relationship of fundamental design factors must be known, for these are the tools we work with.

The two basic flight requirements are LIFT and STABILITY. Lift can be defined as a force acting vertically upward, opposing gravity. When the upward force or lift on an airplane is greater than its weight the plane will rise, when it is less it will descend.

Though sufficient lift is generated for flight, a plane will not *remain* in balance on its course and therefore in flight unless it is stable. So to make lift effective stability is essential. It can be defined as the inherent characteristic built into the design of an airplane that keeps it in balance or causes it to recover balance when forced out of normal flight attitude.

To possess these two flight requirements an airplane must have the following basic mechanical factors:

1. Lifting device
2. Source of power
3. Propelling device
4. Stabilizing means
5. Auxiliary structure to support all necessary units in their proper relative position.

If the plane is required to "take off" and land as well as fly, another factor is necessary: 6. A landing gear. (See fig. 80).

In flight these basic factors function as follows: Power turns the propeller thereby generating thrust, thrust pulls the plane forward overcoming drag or resistance due to the plane's velocity. This simultaneously causes the wing to lift overcoming the pull of gravity equal to plane weight.

It is a simple matter to construct a plane including all of these factors and functions but whether or not it will fly depends on the DEGREE of functioning. ENOUGH LIFT must be generated to raise the WEIGHT of the airplane; THRUST developed by the motor-driven propeller must be sufficient to overcome the DRAG or air resistance to the plane's forward motion, and stability must be great enough to resist all disturbing forces or quickly right the plane before it loses altitude or crashes.

So we see, that to fly, a plane must generate two positively acting forces, thrust and lift, of a degree sufficient to overcome two resisting forces, drag and weight; Fig. 82. The greater the thrust and lift relative to drag and weight respectively, the farther and higher a plane will fly. So it is evident that flight efficiency depends on the relative values of these positive and resisting forces.

To be efficient: 1. A plane must be light compared to its size and power. 2. The propeller must deliver greatest possible thrust for power applied, thereby insuring large thrust with little weight. 3. The wing

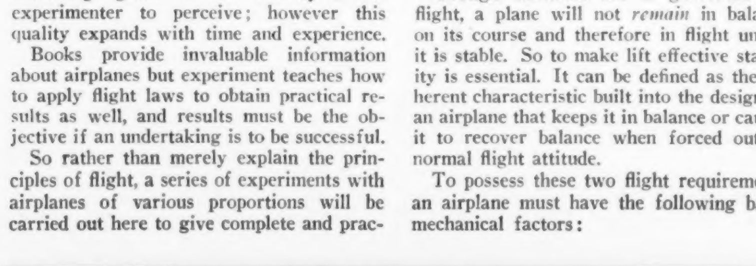


FIG. 81

must generate high lift with little drag, so that little power is required to overcome drag while producing sufficient lift; this also provides a flat long glide, for lift divided by drag is a measure of the gliding angle. 4. The structure must be streamlined, causing least possible drag and thereby reducing power lost uselessly.

But all of these qualifications, or in other words, a plane's efficiency, depend upon the proportion and arrangement of its units—upon its design: *it must be proportioned to generate great lift and thrust with little weight and drag.*

This is only half the problem however, because efficiency cannot be demonstrated by successful flight unless a plane retains its balance—unless it is controllable, stable, or both.

Full scale planes are controllable, the pilot operating moveable control surfaces to maintain balance, so they need not be stable. However if a plane is stable as well as controllable less effort by the pilot is required to retain balance.

Model planes obviously can have no pilot to manipulate controls so sufficient stability to maintain balance at all times and under all flight conditions is imperative—unless you prefer to rebuild wrecked planes than to fly stable ones.

A plane in flight can rotate in three directions: about its lengthwise axis or *laterally*, about its spanwise axis or *longitudinally*, and around a vertical axis through its center of weight (through center of wing) or *directionally*. So there are three types of stability: lateral, longitudinal and directional. Lateral refers to rolling sideways, Fig. 82; longitudinal to nosing down or up, Fig. 83; and directional to turning right or left, Fig. 84.

Lateral stability is maintained by dihedral wings, Fig. 85, tips being elevated above the wing center; this is simple and effective. The horizontal tail surface, or stabilizer, maintains longitudinal stability, its effectiveness being determined by its size and distance M, Fig. 80, from the wing center. The nose length N also affects longitudinal stability: the shorter it is, the more stable. However the most important factor is the angular setting of the stabilizer relative to the wing: the angle of the stabilizer is usually two or three degrees less than the wing angle, measured by lines passing through leading and trailing edges, Fig. 86. This angle is called the longitudinal dihedral angle.

Directional stability is controlled by the fin, its distance from the wing center determining its effectiveness: the closer it is to the wing, the larger it must be. The nose length from the wing to the propeller also affects directional stability, resisting displacement from normal flight but also tending to prevent recovery from any displacement, so for stability it should be as short as possible. The wingspan and size of propeller have a disturbing effect, too.

So we see that the features of the plane, like wing, stabilizer, fin, frame and propeller, affect stability as well as efficiency and it is the problem of the designer to proportion parts and the plane as a whole so it will be both stable and efficient to the maximum degree. Herein lies the secret of fine flying models.

(Continued on page 54)

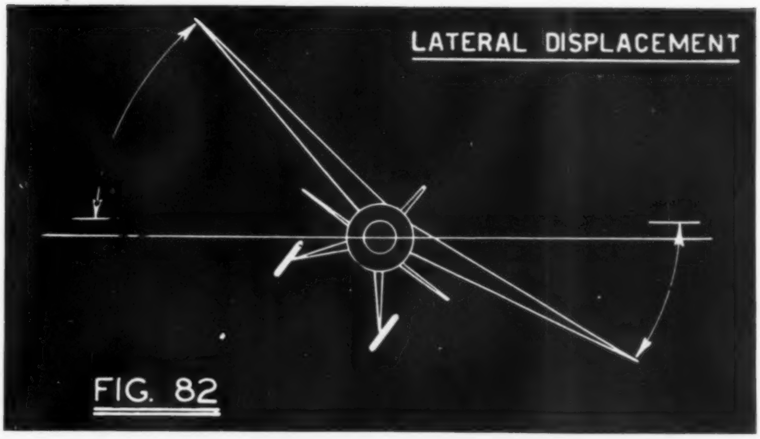


FIG. 82

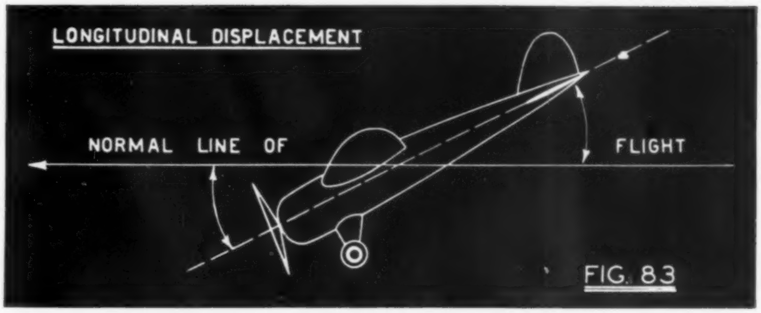


FIG. 83

FIG. 84

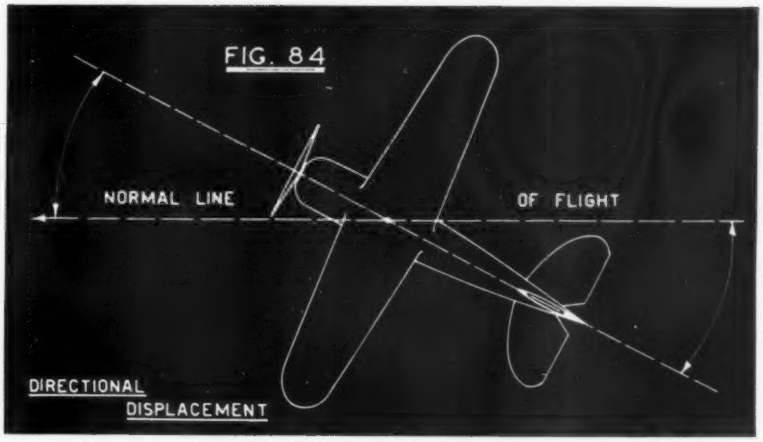


FIG. 85

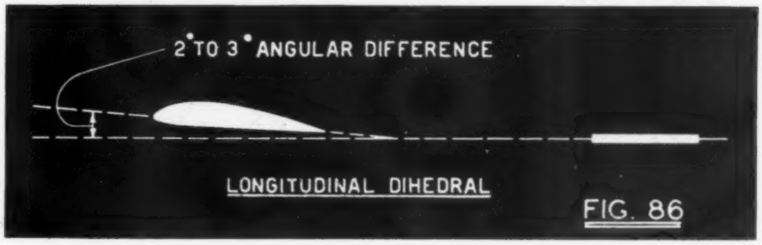
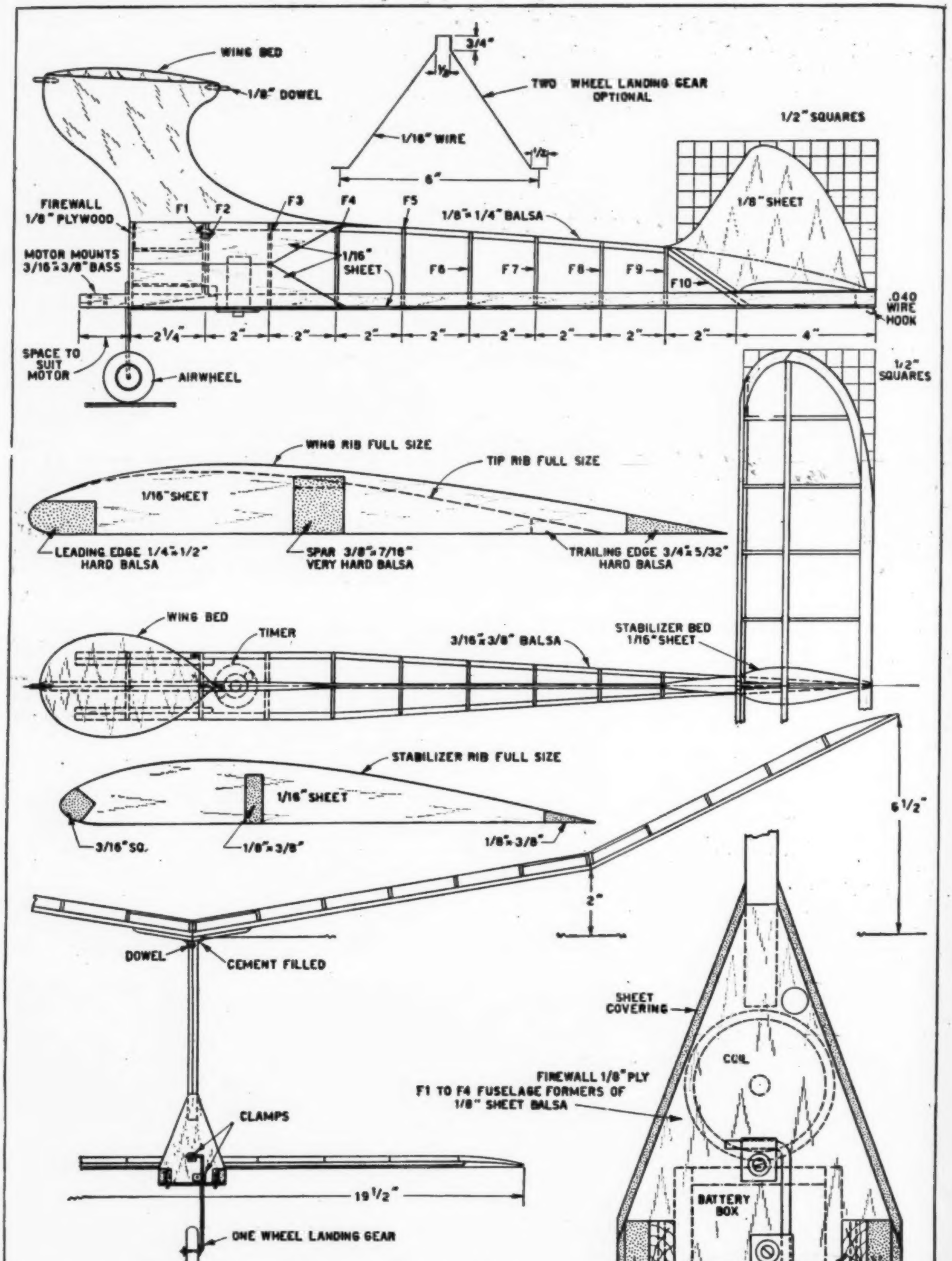
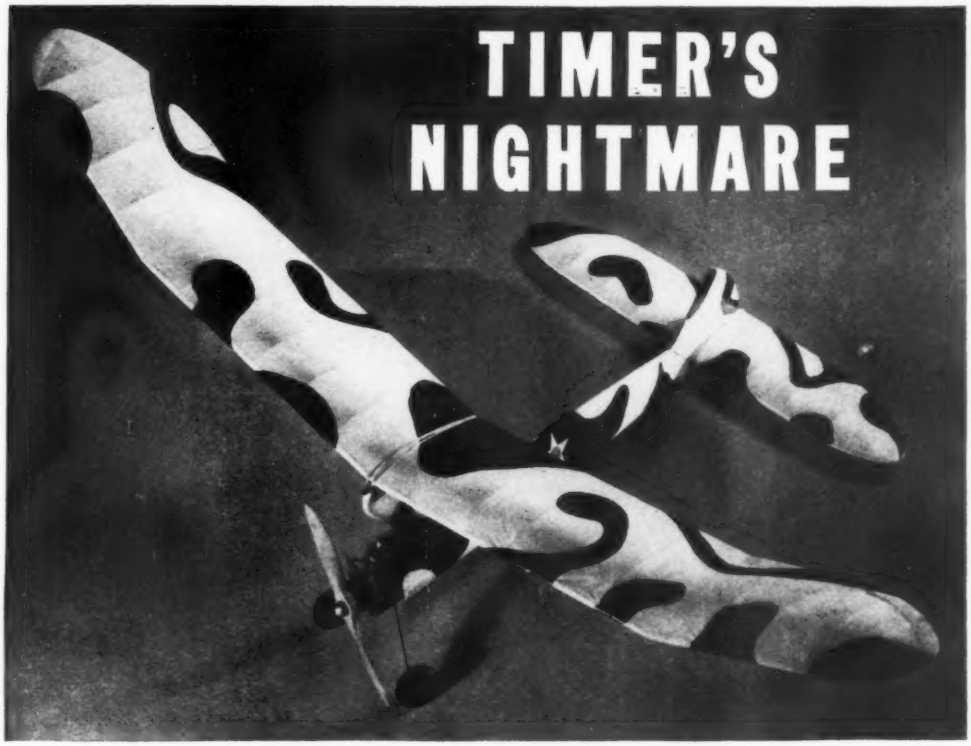


FIG. 86


WING BED
1/8" DOWEL
TWO WHEEL LANDING GEAR OPTIONAL
3/4"
1/16" WIRE
6"
1/2" SQUARES
1/8" SHEET
FIREWALL 1/8" PLYWOOD
F1
F2
F3
F4
F5
1/8" x 1/4" BALSA
MOTOR MOUNTS 3/16" x 3/8" BASS
1/16" SHEET
F6
F7
F8
F9
F10
.040 WIRE HOOK
2 1/4"
2"
4"
SPACE TO SUIT MOTOR
AIRWHEEL
1/2" SQUARES
WING RIB FULL SIZE
TIP RIB FULL SIZE
1/16" SHEET
LEADING EDGE 1/4" x 1/2" HARD BALSA
SPAR 3/8" x 7/16" VERY HARD BALSA
TRAILING EDGE 3/4" x 5/32" HARD BALSA
WING BED
TIMER
3/16" x 3/8" BALSA
STABILIZER BED 1/16" SHEET
STABILIZER RIB FULL SIZE
1/16" SHEET
3/16" SQ.
1/8" x 3/8"
1/8" x 3/8"
6 1/2"
2"
DOWEL
CEMENT FILLED
SHEET COVERING
COIL
FIREWALL 1/8" PLY
F1 TO F4 FUSELAGE FORMERS OF 1/8" SHEET BALSA
CLAMPS
19 1/2"
BATTERY BOX
ONE WHEEL LANDING GEAR
.040 WIRE HOOK
BASS MOUNT
BALSA

A reliable easily-built class A gas model designed to give highest performance under the new control rules—passing from sight in about four minutes

TIMER'S NIGHTMARE



by

FRANK EHLING

HAVE you ever watched a contestant walk up to the processing table, have his ship checked, be assigned to his timer, and go out to turn in a prize winning flight? Well it is not entirely the contestant that deserves the credit; true, he must build and ship and get it in flying form . . . but here we have a ship that need only be built, because she will fly by herself with no tricks necessary to obtain good flights. For this reason it is a favorite with all that have seen her perform.

At the first contest, after a number of test hops, the ship was entered for an official flight. There was little time before the meet to install a dethermalizer for bringing the ship down in the required four minutes, so we got the bright idea of camouflaging the ship to make it invisible after about four minutes had elapsed. But we are still being ribbed, for when it made its second flight the recorded time was only thirty-five seconds (the timer's stopwatch stopped): the actual flight time was three minutes, forty seconds.

The second meet in which this ship was entered was a marathon contest. In such contests the builder is under as much strain as the ship, for the fellow that turns in the most flights over a minute is declared the winner. This meet was between the Linden Model Club and the Jersey Air Wheels. The Linden boys won high; with Minnay first with eight, yours truly second with seven and Mush third with five. This shows the ship to be a consistent flier as well as one capable of high time.

It was designed especially for the new rules. The fuselage shape used gives the least drag for the amount of space required to house the coil, condenser, battery box and timer; also it blends well into the pylon which was used to get the wing high and well forward. This is the best way to spell "stability." The wing was designed with a thin wing section in order to decrease drag in the climb. The long tail moment arm was used in order to make it hard for the ship to soar in a thermal. The ship was designed with a short landing gear (as the new rules permit hand launching) to serve as landing purposes only.

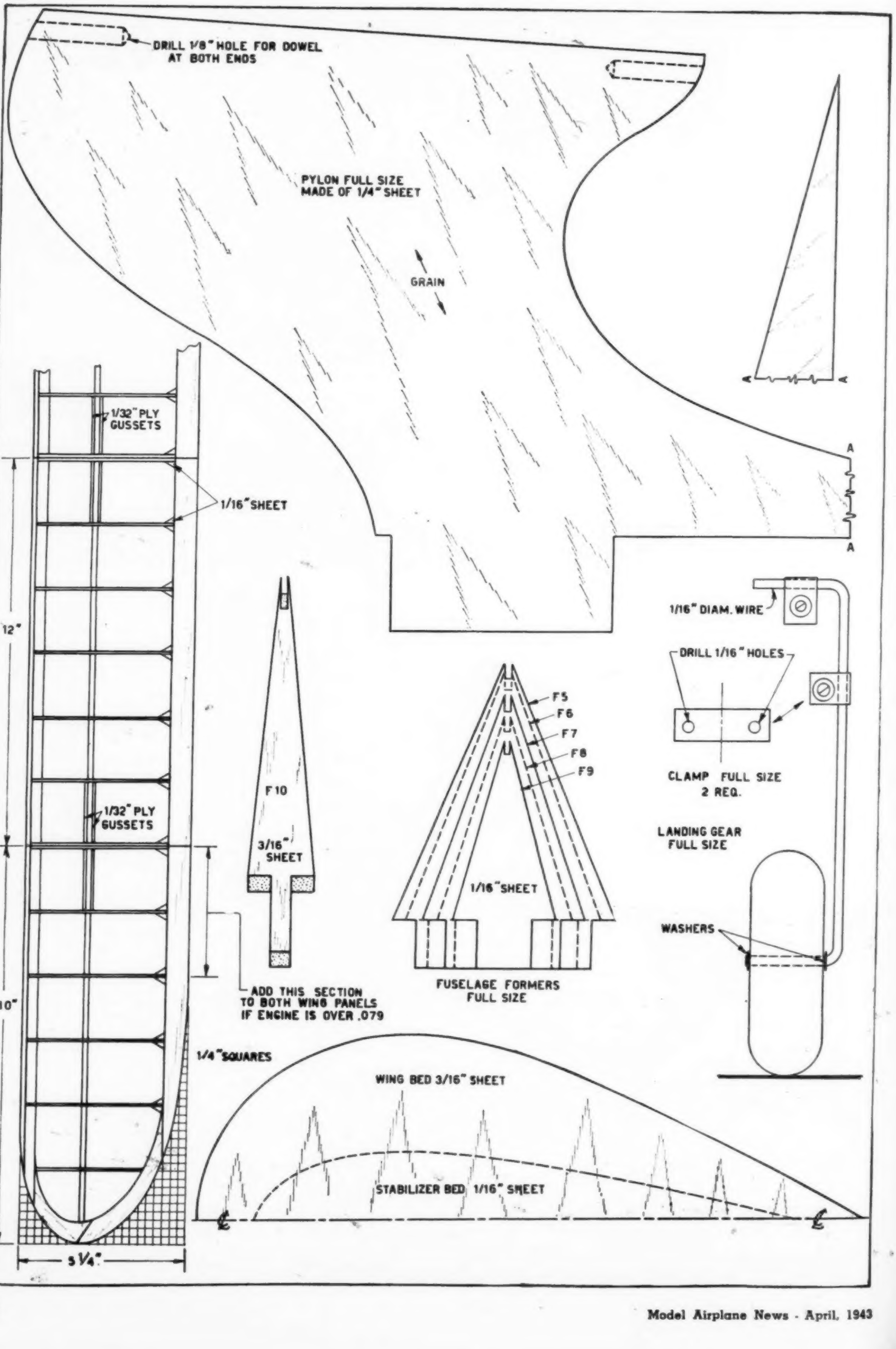
These features put the ship in the high performance class despite the little power. On the wing plan you will notice that there is a section that may be added if a motor with a larger displacement than .097 cu. in. is used; however, motors over .199 should not be used.

Enough talk, a "slip of the lip" won't build this ship; so clear the work table and to work. The plans are one-quarter size, so enlarge the plan of the crutch, wing, stabilizer and rudder four times the size shown on the plan. Start by cementing the motor bearers to the crutch and then assemble. The formers are now cut and cemented in place.

The pylon is now made up and cemented in place. Install the ignition and sheet the sides and bottom as shown on the plan. The landing gear is now bent to shape and bolted in place. The tail

(Continued on page 34)

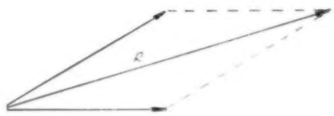
The contest-winning performance as well as appearance of this little "sky rider" brings terror to the hearts of competing modelers


DRILL 1/8" HOLE FOR DOWEL AT BOTH ENDS
PYLON FULL SIZE MADE OF 1/4" SHEET
GRAIN
A
A
1/32" PLY GUSSETS
1/16" SHEET
12"
1/32" PLY GUSSETS
10"
3 1/4"
F10
3/16" SHEET
ADD THIS SECTION TO BOTH WING PANELS IF ENGINE IS OVER .079
F5
F6
F7
F8
F9
1/16" SHEET
FUSELAGE FORMERS FULL SIZE
1/16" DIAM. WIRE
DRILL 1/16" HOLES
CLAMP FULL SIZE 2 REQ.
LANDING GEAR FULL SIZE
WASHERS
1/4" SQUARES
WING BED 3/16" SHEET
STABILIZER BED 1/16" SHEET

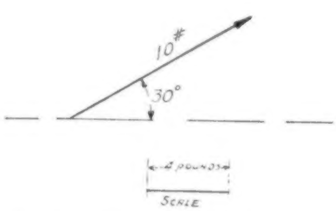
STRESSING YOUR GAS JOB

How to determine stress in model plane structures and to select materials for light weight and strength

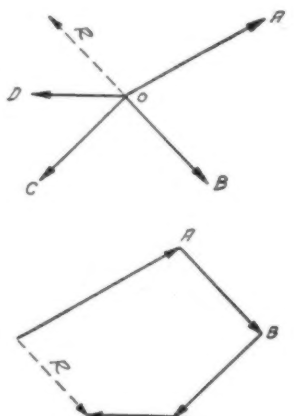
by **LT. J. P. EAMES** *and* **W. L. NYE**



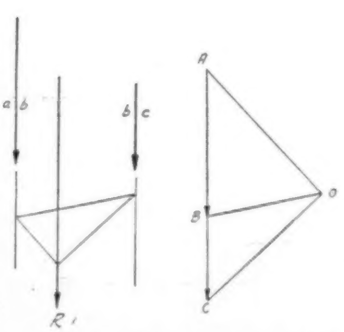
1. Simple resolution of forces



2. Graphic representations of force vector. Scale 1/2" equals 4 lb.



3. Method of resolution of concurrent forces



4. Space and force diagrams used in the resolution of parallel forces

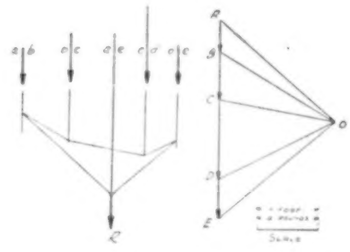
2. Elementary Graphic Statics

STATICS is the branch of Mechanics dealing with forces and bodies in equilibrium. The means of adequately representing their relationship graphically is called Graphic Statics. Forces dealing with stress analysis of model airplane structures discussed in these articles, are vector quantities; that is, they possess both magnitude and direction. They may be represented graphically by means of straight lines, the length of a line representing magnitude of the force, drawn usually to some selected scale. Its direction represents the force's line of action. Fig. 1 illustrates two vector quantities that represent the components of a force. They are resolved into resultant force R, by combining the forces as two sides of a parallelogram of which R forms the diagonal. Either half of the figure is designated as a force triangle. A force, equal and opposite to R, would maintain the two original forces in equilibrium. For purposes of analysis, the lengths of vector quantities are drawn to a definite scale and in a definite position (Fig. 2), wherein a force of 10 lb. is assumed acting at an angle of 30 degrees to the horizontal axis.

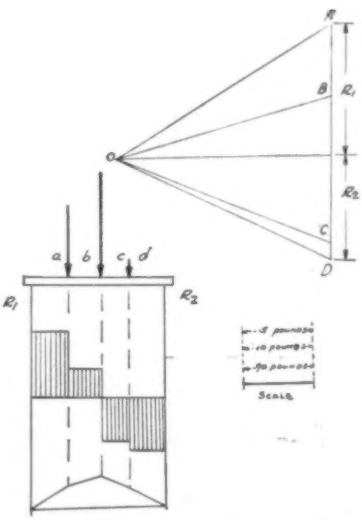
To obtain the resultant of a system of concurrent forces, or those in which lines of action of all forces involved pass through a common point, the force polygon is employed. This entity, shown in Fig. 3, is described by drawing vector quantities equal and parallel to the forces represented in the manner illustrated. The magnitude and position of resultant R of the system is indicated by length and direction of the line necessary to close the figure.

Determining the resultant of a system of forces, acting parallel to each other, is simplified by employment of a space diagram as well as a force diagram. Fig. 4 indicates the method which uses both diagrams. Parallel forces are assumed to act along the line AC, the vertical component of the force diagram, and equal in magnitude to the sum of the forces involved. Any convenient point O, termed the pole, is selected and rays drawn from point O to the extremities of the component forces. Lines parallel to these rays reproduced on the space diagram beneath the original forces, determine the position of the resultant force. The polygon described on the space diagram is designated as the funicular polygon. Fig. 5 illustrates the graphical method of determining the resultant of a system of parallel forces of defined magnitude and position. Resultant is found to be of the magnitude 12-1/2 lb., acting at a distance of 6 in. from the largest force.

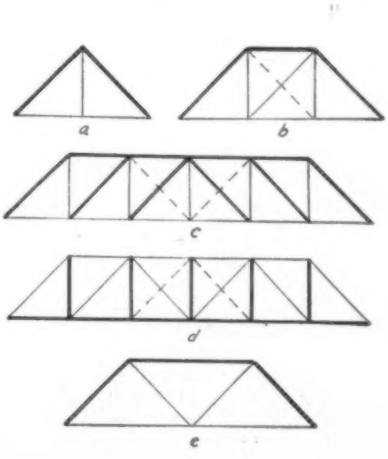
(Continued on page 35)



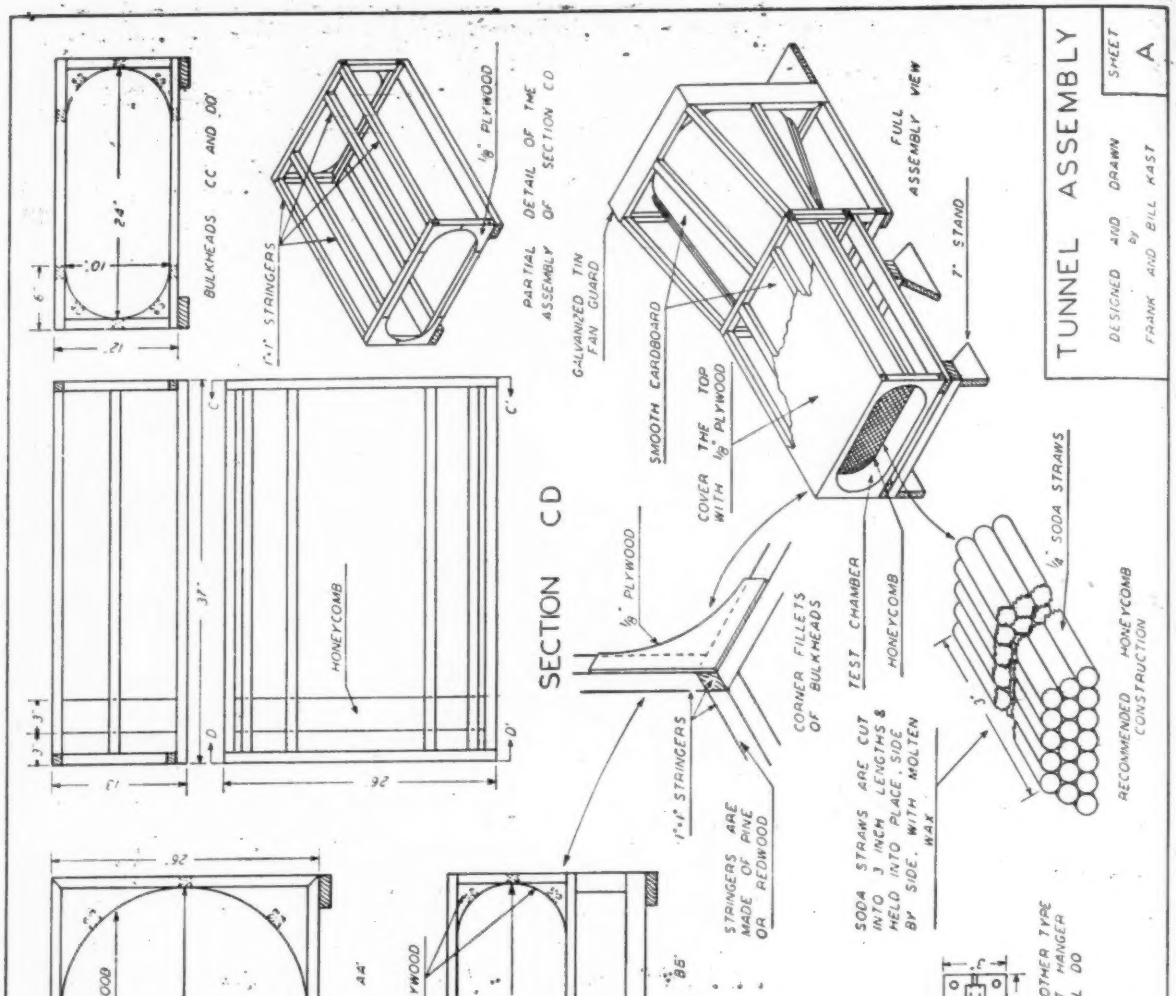
5. Method of resolution of parallel forces. Scale of distances: 3/8" equals 1 ft. Scale of forces: 3/8" equals 4 lb.



6. Construction of shear and bending moment diagrams. Scale of forces: 7/16" equals 5 lb. Scale of shears: 7/16" equals 10 lb. Scale of moments: 7/16" equals 90 lb.



7. Common types of trusses


TUNNEL ASSEMBLY
DESIGNED AND DRAWN by FRANK AND BILL KAST
SHEET A
FULL ASSEMBLY VIEW
7" STAND
GALVANIZED TIN FAN GUARD
SMOOTH CARDBOARD
COVER WITH THE TOP 1/8" PLYWOOD
TEST CHAMBER
HONEYCOMB
1/4" SODA STRAWS
RECOMMENDED HONEYCOMB CONSTRUCTION
SODA STRAWS ARE CUT INTO 3 INCH LENGTHS & HELD INTO PLACE, SIDE BY SIDE, WITH MOLTEN WAX
BULKHEADS CC AND DD
1"x1" STRINGERS
1/8" PLYWOOD
PARTIAL ASSEMBLY DETAIL OF THE OF SECTION CD
SECTION CD
HONEYCOMB
1/8" PLYWOOD
CORNER FILLETS OF BULKHEADS
1"x1" STRINGERS
STRINGERS ARE MADE OF PINE OR REDWOOD
BULKHEAD AA'
BULKHEAD BB'
1/8" PLYWOOD
ANY OTHER TYPE SHAFT HANGER WILL DO
FAN MOUNT CAST IRON
SECTION AB
COVER THE INNER FORM OF THE TUNNEL WITH A SMOOTH CARDBOARD MAKE CERTAIN THAT IT DOES NOT WRINKLE, AND THOROUGHLY WAX THE INNER SURFACE
SEE INSERT BELOW FOR DETAILS OF THE SHAFT HANGER
GALVANIZED TIN FAN GUARD
1"x1" STRINGERS
1/8" PLYWOOD
PARTIAL ASSEMBLY DETAIL OF THE OF SECTION AB

BUILDING YOUR OWN WIND TUNNEL

Experiment and discover the fundamentals of aerodynamics for yourself

by FRANK *and* BILL KAST

ALL airplane modelers should be interested in a wind tunnel to further their knowledge of the elements of aerodynamics. For this reason, we have designed and built a simple wind tunnel for three specific types of model builders. First, those builders who are not familiar with the rudiments of aerodynamics; second, those others who read extensively on the subject, but somewhere have acquired a wrong idea, and third, the experienced model builders who are well versed in the subject and want "to do something" about it.

The purpose, then, of this wind tunnel is to give a builder in the first group a chance to find out what aerodynamics is all about; to enable one in the second group to discover where he has slipped up, and to give the experienced builder a chance to further his knowledge by experimentation and research.

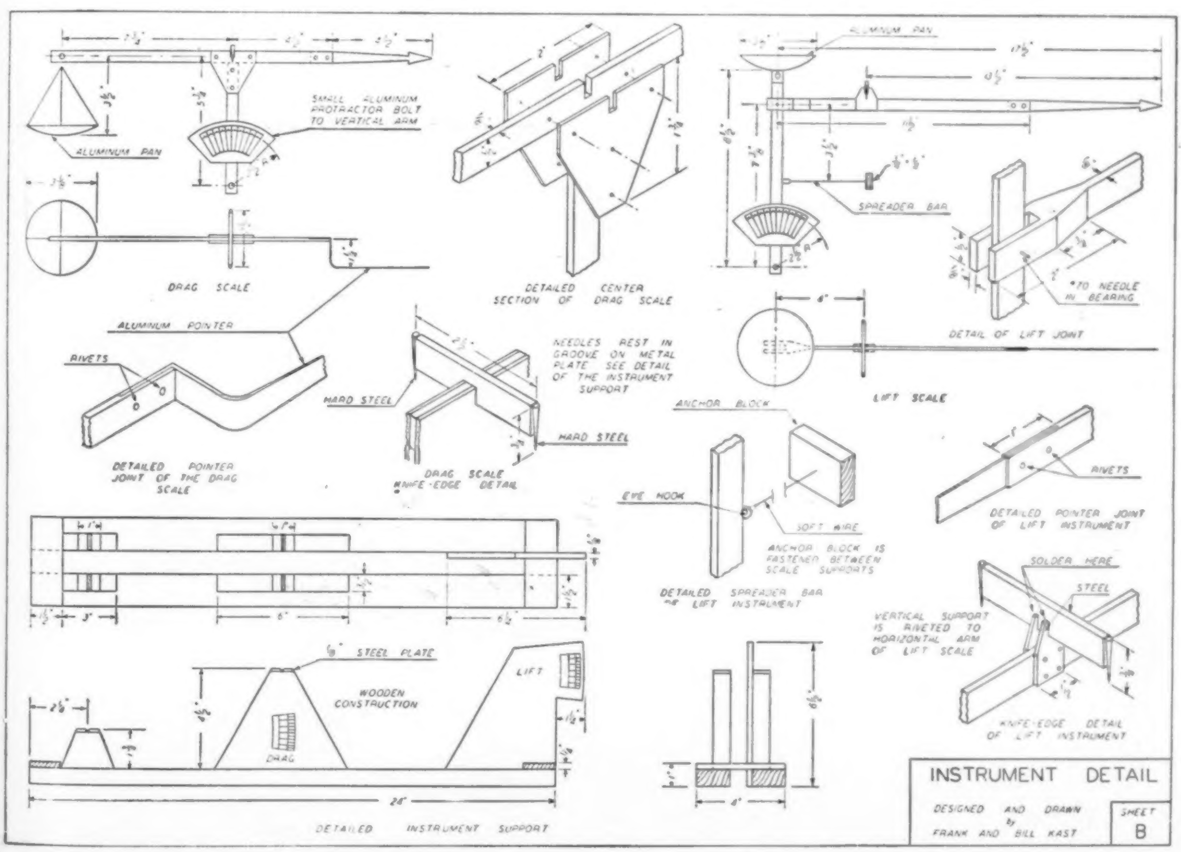
In this article we strive to explain the operation and construction of a wind tunnel that can be easily understood by all. We regret that the formulas used in the computations will merely be stated here, since the derivations of such are too lengthy and involve too much advanced mathematics and mechanics for a discussion of this scope.

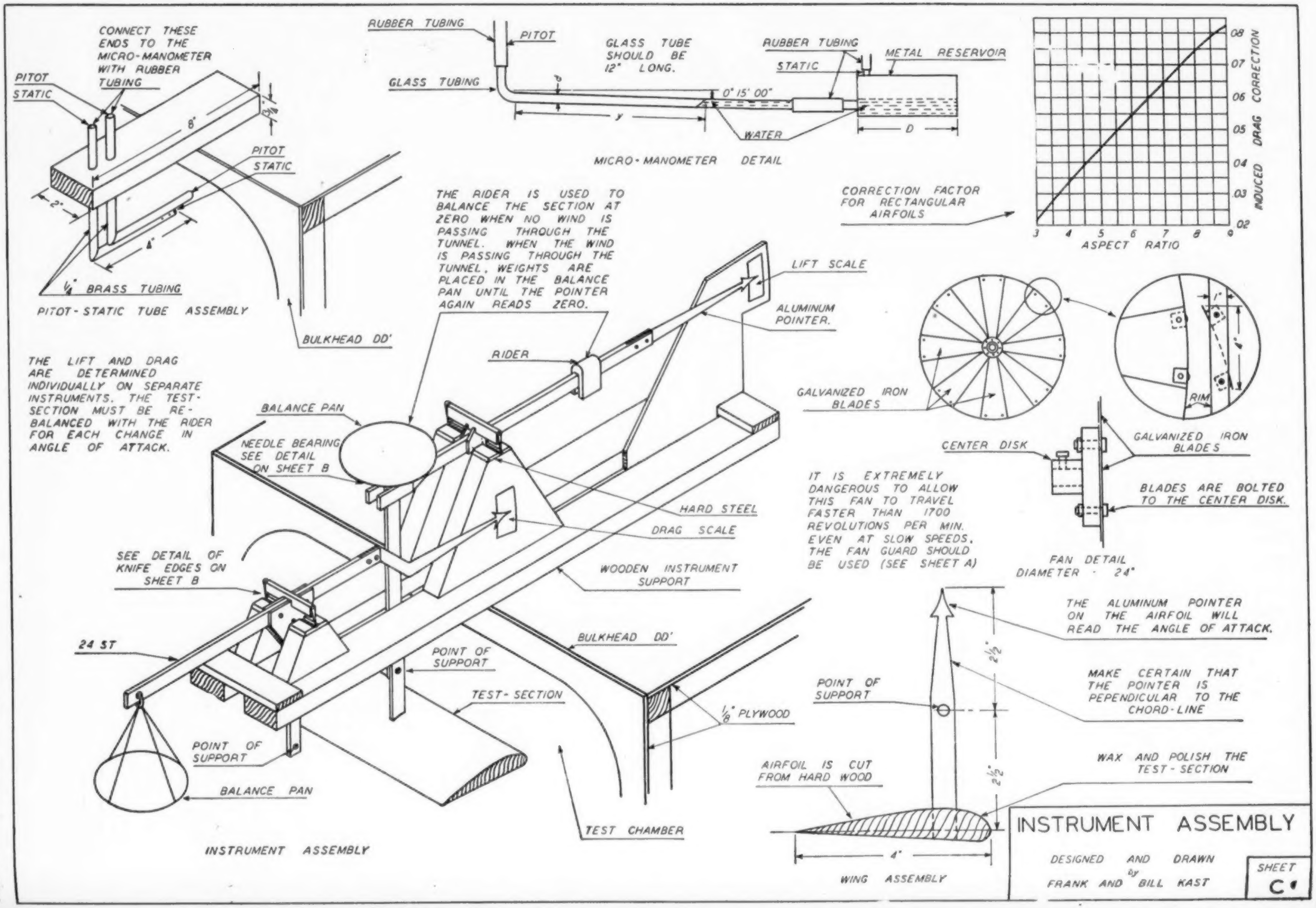
CONSTRUCTION: The fan is constructed of a stiff type of sheet metal, such as heavy galvanized tin, about 1/32" thick. The blades are cut in the shape shown on plate C; they can be bolted to a small center disc, such as a light fly-wheel. (See sheet C.) A 1" rim is necessary to strengthen the blades at the circumference if too light a metal is used. The pitch at which the blades should be set will depend upon strength of the motor used. The blades can now be set at this desired pitch and bolted to the rim as shown on plate C. The fan is then mounted as close to bulkhead AA' as possible, so that all the wind created by the fan be utilized. The mount shown on plate A is probably the most practical for this type of fan. Use a V-belt to drive the fan, as shown in the picture. It is extremely dangerous and therefore not advisable to allow the fan to turn faster than 1700 rpm. Traveling at this speed, with very low pitch, the fan should develop approximately a 40 or 50 mph wind velocity.

In the construction of section AB (see plate A), first construct the two end bulkheads. Each consists primarily of a rim, made of 1" sq. pine or redwood, much in the same manner as a window frame. For bulkhead AA', two semi-circular fillets cut from 1/8" plywood are screwed to the frame to form the circular section at the fan. Two smaller semi-circular fillets are also screwed to the upper portion of the frame of bulkhead BB'. Two pine battens, 1" x 3", form the base of the section and keep the two bulkheads the desired distance apart. When the two bulkheads are securely bolted to the base and temporarily braced the additional 1" sq. stringers can be screwed into place, forming the tunnel's inner shape. Cover the inner form with a medium-heavy cardboard which, if sufficiently smooth on the inner surface, will serve the purpose. Make certain the cardboard does not wrinkle, since the inner surface of the tunnel must be as smooth as possible.

The construction of Section CD (see plate A) is approached in exactly the

(Continued on page 45)

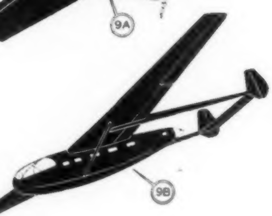


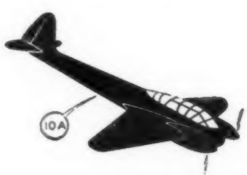

CONNECT THESE ENDS TO THE MICRO-MANOMETER WITH RUBBER TUBING
PITOT
STATIC
8"
PITOT
STATIC
2"
1/4" BRASS TUBING
PITOT-STATIC TUBE ASSEMBLY
BULKHEAD DD'
RUBBER TUBING
PITOT
GLASS TUBING
GLASS TUBE SHOULD BE 12" LONG.
d
y
0° 15' 00"
RUBBER TUBING
STATIC
METAL RESERVOIR
WATER
D
MICRO-MANOMETER DETAIL
CORRECTION FACTOR FOR RECTANGULAR AIRFOILS
.08
.07
.06
.05
.04
.03
.02
INDUCED DRAG CORRECTION
3 4 5 6 7 8 9
ASPECT RATIO
THE LIFT AND DRAG ARE DETERMINED INDIVIDUALLY ON SEPARATE INSTRUMENTS. THE TEST-SECTION MUST BE RE-BALANCED WITH THE RIDER FOR EACH CHANGE IN ANGLE OF ATTACK.
THE RIDER IS USED TO BALANCE THE SECTION AT ZERO WHEN NO WIND IS PASSING THROUGH THE TUNNEL. WHEN THE WIND IS PASSING THROUGH THE TUNNEL, WEIGHTS ARE PLACED IN THE BALANCE PAN UNTIL THE POINTER AGAIN READS ZERO.
LIFT SCALE
ALUMINUM POINTER.
RIDER
BALANCE PAN
NEEDLE BEARING SEE DETAIL ON SHEET B
HARD STEEL
DRAG SCALE
SEE DETAIL OF KNIFE EDGES ON SHEET B
WOODEN INSTRUMENT SUPPORT
24 ST
BULKHEAD DD'
POINT OF SUPPORT
TEST-SECTION
1/8" PLYWOOD
POINT OF SUPPORT
BALANCE PAN
TEST CHAMBER
INSTRUMENT ASSEMBLY
GALVANIZED IRON BLADES
1"
4"
RIM
CENTER DISK
GALVANIZED IRON BLADES
BLADES ARE BOLTED TO THE CENTER DISK.
FAN DETAIL
DIAMETER - 24"
IT IS EXTREMELY DANGEROUS TO ALLOW THIS FAN TO TRAVEL FASTER THAN 1700 REVOLUTIONS PER MIN. EVEN AT SLOW SPEEDS, THE FAN GUARD SHOULD BE USED (SEE SHEET A)
THE ALUMINUM POINTER ON THE AIRFOIL WILL READ THE ANGLE OF ATTACK.
MAKE CERTAIN THAT THE POINTER IS PEPENDICULAR TO THE CHORD-LINE
POINT OF SUPPORT
2 1/2"
2 1/2"
WAX AND POLISH THE TEST-SECTION
AIRFOIL IS CUT FROM HARD WOOD
4"
WING ASSEMBLY
INSTRUMENT ASSEMBLY
DESIGNED AND DRAWN by FRANK AND BILL KAST
SHEET C

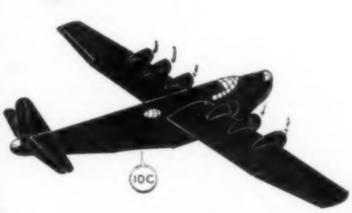
Silhouette Review

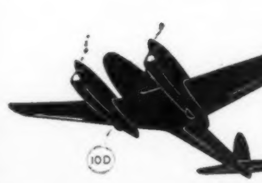
FOURTEEN months ago Sky Scouts was organized by MODEL AIRPLANE NEWS to help train the youth of our nation in spotting airplanes.

Each month during the past year silhouettes of enemy aircraft were presented in order to give practice in spotting to all who joined the organization. A complete description of the various planes accompanied the silhouettes.









SKY SCOUTS

Learn to spot enemy planes and help defend America

Anyone could join; naturally there were some qualifications. To qualify as a Sky Scout the names of each ship in two sets of silhouettes had to be sent in to Sky Scout headquarters; MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City; whereupon a silver Sky Scout pin was sent to the qualifying members. To become an Expert Sky Scout names of 12 sets of planes had to be submitted. Those who submitted all 12 sets qualified as Expert Sky Scouts and were to receive a gold pin, but due to war requirements it has been impossible to obtain these gold pins, so a membership card will be given instead.

Many have enrolled during the twelve months; some several months after the first silhouettes appeared. Consequently they have not been able to send in answers to silhouettes they have missed. However, now that all 12 sets have been printed we are presenting a resume of these, four sets each month, so that if any silhouettes have been missed by members they will have a chance to send in the names of each silhouette printed and become Expert Sky Scouts. The first four sets were printed in the February 1943 issue; the second in March, and the last four sets appear in this issue.

Names and descriptions accompany the silhouettes so as to help members concentrate on the characteristics of the silhouette. Naturally in order to pick out the right name the silhouettes should be examined. This serves as practice.

So, all Scouts who have not sent in the 12 sets of answers—get busy—and as they

(Continued on page 34)

Description of Silhouettes—9, 10, 11 and 12

PLANE 9A—Blohm und Voss Bv 141 single motor unsymmetrical monoplane designed by Dr. Ing. Richard Vogt for all-purpose tactical work. Craft has gained, and may maintain, reputation of being this war's most unorthodox creation. According to German radio broadcasts it is powered by one 1,600 hp. BMW 801 motor mounted on the port wing panel at the nose of a boom which also supports the half tail and rudder. Cabin nacelle is on the starboard wing with provisions for a crew of three. It is said to carry 2 cannons and 2 machine guns. Further Nazi claims state the craft is capable of high speed and maneuverability. Conservative figures based upon known engine performance indicate it capable of some 290 m.p.h. at 17,000 ft. The Bv 141 is now believed to be in production in Eastern Germany.

PLANE 9B—Gotha Go 242 troop transport and military cargo glider. Used in the Libyan campaign; capable of transporting 23 fully equipped soldiers or about two tons of freight. Wingspan, 79 ft.; overall length, 52 ft., 6 in. The troop-carrying nacelle is about 37 ft. long. Twin tail is supported by booms. Empty, it is supposed to weigh 3,200 lbs.; loaded, 8,500 lbs. The craft is usually towed by Junkers Ju 52/3m.

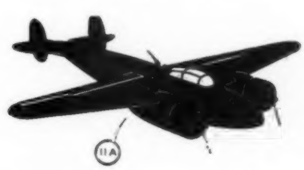
PLANE 9C—DFS 230A1 ten-seat troop transport glider designed primarily as an experimental prototype for much larger gliders used by the German Air Force, and still a carefully guarded secret. The DFS has span of some 70 ft. and overall length of 37 ft. Weight empty is reported as 1,700 lbs., loaded at 4,500 lbs. It made its first appearance at Crete. This machine and the Gotha glider have been designed by Hans Jakobs eminent German glider designer.

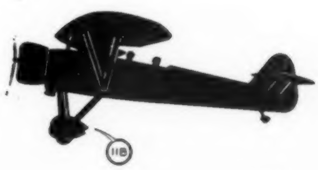
Answer to the three view silhouette on this page is: Nakajima 97 single seat low-wing fighter. Details published on page 38, April issue.

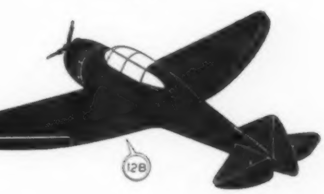
PLANE 10A—The Messerschmitt Me 210 is a long range fighter-bomber developed from the Me 110 but with a much greater capacity for bombs and longer range. It is believed that the crate carries about 4,000 lbs. of bombs. It is a two seater plane powered by two 1,459 hp. Mercedes-Benz DB 603 motors. Its armament consists of two cannon and four machine guns all located in the nose. Maximum speed is said to be 285 m.p.h. at 18,500 feet; span 53 ft. 6 in.; length, 36 ft. 4 in.

PLANE 10B—The Cant Z 1007 *bis* long range bomber. Reputed to be one of Italy's best airplanes the 1007 is constructed of wood and is powered by three 1,000 hp. Piaggio P XI, RC 40 fourteen cylinder double row engines. Top speed

(Continued on page 34)

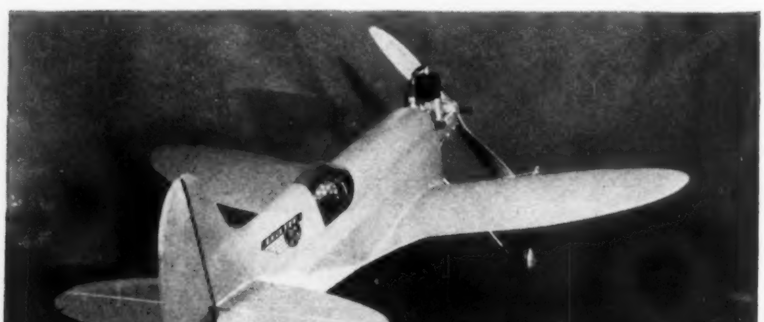






AIRWAYS

Above 1. A flying scale Curtiss P-40D including all details, by D. Eiben.
Below 2. A Curtiss P-40D U-control gas model; a thrill to any pilot.



News of modelplane experimenters from all parts of the world

As warmer weather creeps in upon us new models are emerging from numerous workshops, where they have been gradually taking form during the winter months.

This is an annual occurrence, but this year promises an advent of many new and interesting designs. There are several reasons for this: first, planes will be made of hardwood or other new material because of the ban on balsa; this has forced model builders to "put on their thinking caps" and guide their imaginations into strange new fields.

Hardwood construction, due to its extra weight, prompts builders to refine their model construction, and in many cases complicate them through necessity of adding more complex and delicate parts to replace simple but heavy units. New building techniques also have been investigated and developed; old-type cement doesn't work well with harder woods unless the gluing areas and joints are increased several times. In many cases other types of adhesive must be used to obtain required strength.

Builders now must work out their model structures carefully. The procedure of cutting out crude bulky parts and putting them together in slipshod manner cannot be tolerated without making the model so heavy that its flight is materially reduced. For this procedure more refined construction and greater thought must be substituted.

Now it is advantageous to have a broad understanding of stresses involved so when weight is added it can be placed at the point where it is going to do the most good, and to know which parts are lightly stressed so their weight can be cut to a minimum. We call attention to the series of articles,

Left 4. A U-Control model showing excellent workmanship. *Left Above* 3. A detail scale Grumman F2F-3 including retractable landing gear and sliding hatch.

"Stressing Your Gas Job" which started in the March issue. This will give you a basic understanding of mechanics and the stresses in planes; it should be of great help to serious-minded builders.

Another factor which will influence model design this year is the war; the fact that young men are thinking in terms of full scale airplanes and the part they are playing on the battlefronts. We will expect to see a larger percentage of scale flying models, most of them probably gas models, and a trend away from the conglomerate and hybrid combinations of wing, tail, fuselage, etc., that "haunt" most contests.

Yes, this should be an interesting year and we eagerly await the advent of coming contests to see what American ingenuity will bring forth.

An excellent sample of craftsmanship is evidenced in picture 1, showing a carefully detailed scale Curtiss P-40. As a scale model it surpasses most models we have seen—but that is not all—it is a flying model as well, having a 28" wingspan and boasting of retractable landing gear and sliding cabin hatch. It is a beautiful job built by D. Eiben of 14516 Madison, Lakewood, Ohio. We list this as the finest flying scale model that has appeared to date in Model Airplane News.

The Curtiss Hawk seems to be a favorite among many builders, and rightly so, for it has established an enviable record on all the fighting fronts. F. C. Townsend of 2727 Hopi Place, Tucson, Ariz., sends us picture 2, also showing a model of the Curtiss P-40D. Do not make the mistake of thinking this a solid scale model as it appears to be—believe it or not, it is a U-control gas model. It has a wingspan of 52", is 42" long and weighs 5 1/2 lb. powered with a Hornet motor. An unusual feature is its 3-bladed scale propeller.

These are two of the models that have come out of winter workshops and apparently are fulfilling our prediction that many of the 1943 ships will be built to scale.

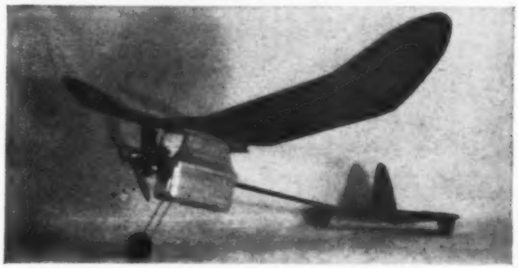
Details have been carefully worked out by Mr. Townsend and include a sliding cockpit cover, miniature machine guns in the wings, twin Allison exhaust stacks, supercharger using air from the propeller which is forced in a venturi of the Hornet motor, thus stepping up its power. We can imagine that to fly this ship would give a thrill to any modeler.

Herbert Rosenman of 3133 Rochambeau Ave., New York City is another scale model enthusiast and sends us picture 3, showing

(Continued on page 36)

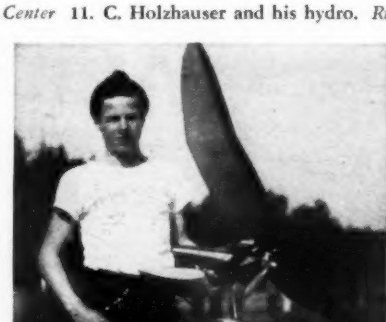
Above **5. Richard Bamback's detail scale model Waco C-6, photographed indoors with sunlight.** *Below* **6. Jim Boyd's gas job of unique design.**

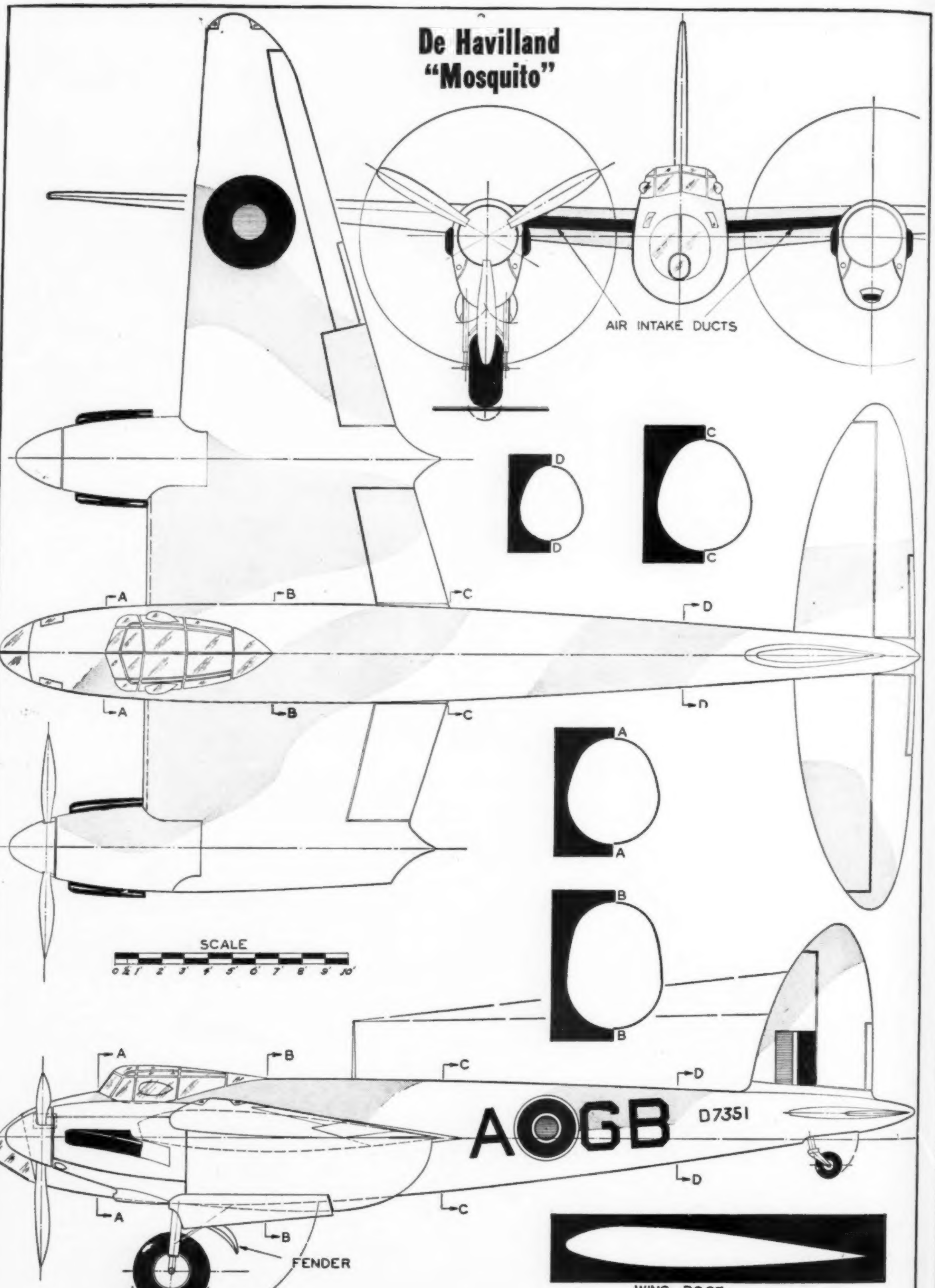
7. A model builder's handy knife made from a fountain pen.



Above **8. A gas model made of a box and fishpole.** *Below* **9. Stan Staples' beautiful scale Airacobra.**

Below Left **10. Bob Keyes and his Manta.** *Center* **11. C. Holzhauser and his hydro.** *Right* **12. G. Lambrecht and his scale Douglas.**




De Havilland
"Mosquito"
AIR INTAKE DUCTS
A
B
C
D
SCALE
0 ½ 1' 2' 3' 4' 5' 6' 7' 8' 9' 10'
A GB
D7351
FENDER
WING ROOT
WING TIP

DeHAVILLAND MOSQUITO

Plane on the cover

by **ROBERT McLARREN**

CAPTAIN GEOFFREY de HAVILLAND bears one of the oldest names in aviation and his influence throughout the aviation industry has been felt in every corner of the globe. He entered aviation in the hectic 1909-12 period during which dozens of men were staggering aloft on the fragile wings of weird creations, some out of a surrealist's dream, which a pilot today would hardly agree to taxi across a field. When the first World War burst into flame on August 5th, 1914, de Havilland had a small shop and several machines in flying condition which were immediately purchased by the British government and requests for more were made. The next four years brought fame and fortune to Captain de Havilland and brought into prominence the D.H. 4, standard observation two-seater of the Allied nations; the D.H. 5, a staggered wing fighter, and the D.H. 9, a somewhat modified D.H. 4, used extensively for training purposes in the United States and, following November 11th, 1918, for many years as an observation machine. Some were used in the forestry service as late as the middle 'twenties.

De Havilland concentrated on commercial airplanes following the close of the war and succeeded in building one of the world's largest aircraft enterprises at Hatfield, Herts, England, the head office of the many huge divisions and subsidiaries of the firm. The D.H. Tiger Moth was and still is one of the world's most widely used training machines and the D.H. Dragon biplane became as well known throughout the world as any airplane in history while carrying the colors of the British over the Imperial and other Airways. De Havilland motors became famous and he concentrated on the design of small, in-line air-cooled engines folling the first Gypsy introduced in 1927. The latest in the long line of successful commercial airliners is the beautiful Albatross, a four-motor 30-passenger monoplane with the most pleasing lines of any ship of its type ever designed and the Flamingo, a high-wing 20-passenger transport powered by two Bristol air-cooled radial engines.

Since the outbreak of the second World War on September 3rd, 1939, de Havilland had supplied Tiger Moth trainers, Albatross and Flamingo radio and navigational trainers and transports and engines and propellers to the empire training scheme through its subsidiaries: De Havilland Aircraft Co., Ltd. of New Zealand, Australia, Canada, India, South Africa and Rhodesia. Its propeller works at Edgeware, Middlesex and Bolton, Lancashire are believed to be the largest in the entire world and are producing to the Hamilton Standard (U.S.A.) constant-speed design under license.

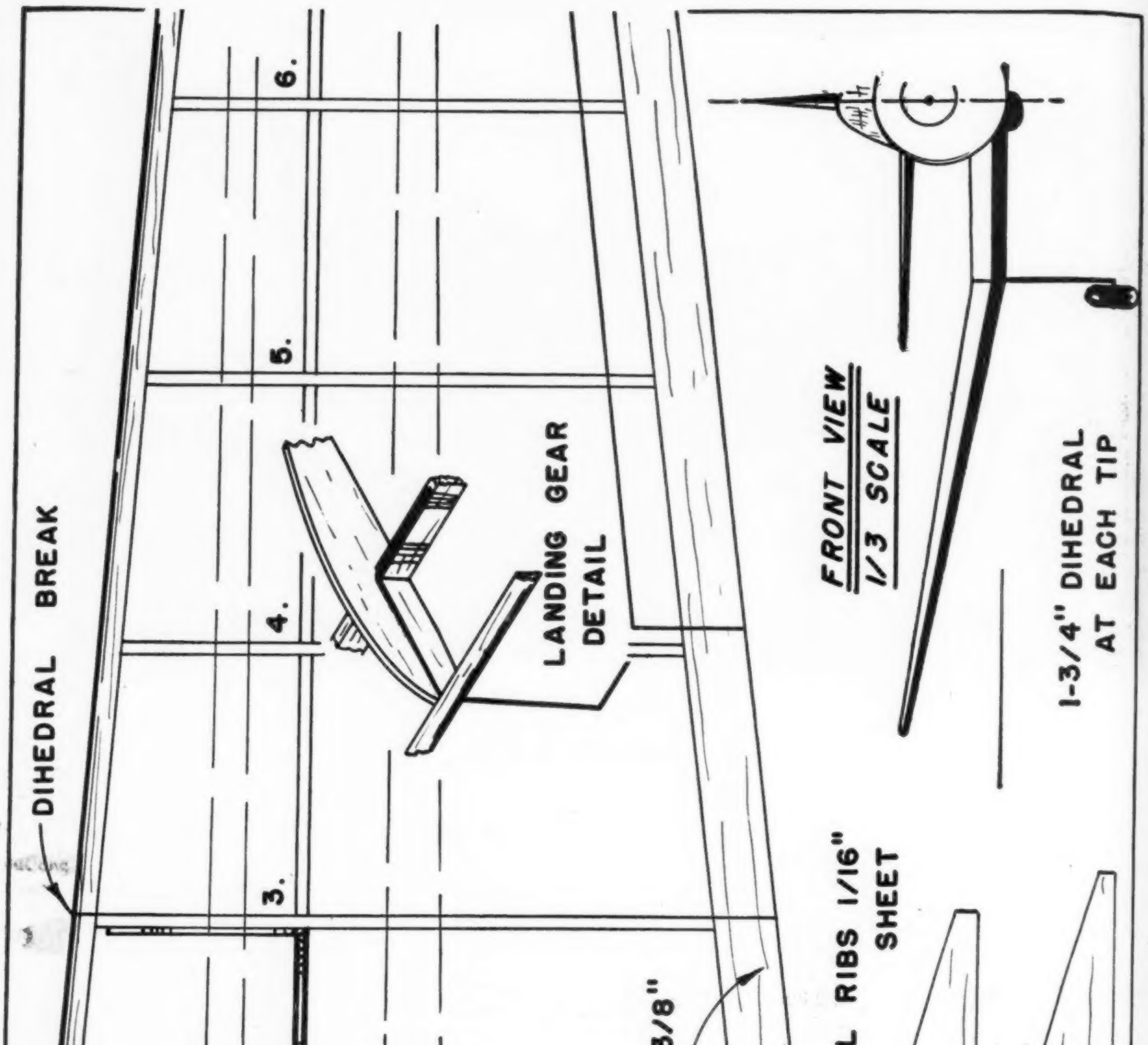
But there had been no De Havilland military airplanes until the papers announced that a new type, known as the Mosquito, had been used in a highly successful daylight raid on Oslo, Norway during which Nazi headquarters there were badly damaged. The new bomber was later identified as a de Havilland product and its fame was established when at least three of them penetrated Berlin's defenses on January 30th at the exact hour Reichsmarshal Goering was scheduled to deliver the Nazi Party's Tenth Anniversary address at the Air Ministry. The speech was completely disrupted by the bursting bombs, the first R.A.F. daylight raid of the war on the city. The fast Mosquitoes escaped without loss and returned again at 4 p.m. as Goering was commencing a second speech at the huge Berlin Sportspalast. One was missing following the second attack.

The raid was a bursting rocket announcing the Mosquito to the world and MODEL AIRPLANE NEWS becomes, again, the hosts at the coming-out party for a new military machine, the De Havilland Mosquito reconnaissance-bomber shown on our cover this month.

Some weeks ago we had the lucky opportunity of inspecting a Mosquito bomber on the West Coast, where it was sent on an exhibition tour of various factories for engineering studies, and one gets the impression of beauty, strength and speed instantaneously. The plane is all wood construction, fabricated in huge concrete molds. It is made in two half-shells comprising a plywood layer, a layer of casein glue, a filler and binder material, more glue and another plywood layer. These two half-shells are placed in the mold with a huge rubber balloon between them. The upper half of the mold is lowered in place (it weighs nearly five tons) and bolted. Heat is then applied to the inside and the balloon is blown up under great pressure.

After being allowed to cool, the mold is removed and the fuselage shells are ready for attachment and installation of equip-

(Continued on page 56)


DIHEDRAL BREAK
1/8" SHEET LEADING EDGE
1/16" SHEET SPAR
1/8" X 3/8"
ALL RIBS 1/16" SHEET
LANDING GEAR DETAIL
FRONT VIEW 1/3 SCALE
1-3/4" DIHEDRAL AT EACH TIP
1.
2.
3.
4.
5.
6.

FLY THIS MILES MASTER

How you can build and fly a model of Britain's fastest training plane

by **SYDNEY STRUHL**

As OUR flying scale feature this month we present the ship in which British fighter pilots receive their final instructions, the Miles Master. The Master is the fastest single engine training plane yet produced, a machine specially designed to provide familiarity with all the advanced scientific equipment and handling characteristics of high speed pursuit planes.

When the student-pilot completes his final stages of training in the Miles Master he transfers over to a Spitfire or new Hurricane with no sudden change of new technique. He is, thanks to this training plane used, almost immediately at home in the fastest of operational pursuit planes.

In all but top speed, the Master's performance is comparable to that of present day fighters; and the flying and handling characteristics are very similar. For example, the wing loading of the Master is the same as the famed Spitfire.

Construction is almost entirely of wood, spruce members covered with three plywood, which gives a very rigid structure. For a long period metal has been the only material used in the RAF for high performance aircraft; but wood, for a high performance training plane, retains its advantages and is fully justified by the performance of the Miles Master. The design provides the same strength and safety factors as metal and in addition, the wood, which is often easier to repair, is not likely to present a shortage such as metal would.

The Master is powered by a 585 hp Rolls-Royce Kestrel XXX engine, has a maximum speed of 270 mph at 15,000 feet and cruising speed of 220 at the same altitude. Climbing at 1,500 per minute, service ceiling is 28,000 feet and an absolute ceiling of nearly 30,000. Range is estimated to be 500 miles. The Master has a wingspan of 39 feet, is 30 ft., 8 in. long, and measures 10 ft. in overall height.

A model of the Miles Master is interesting to build and fly. Structural simplicity and efficient aerodynamic design combine to produce a low-wing model with flight capacity comparable to many high-wing models, flying steadily with plenty of power and the appearance of a full size plane.

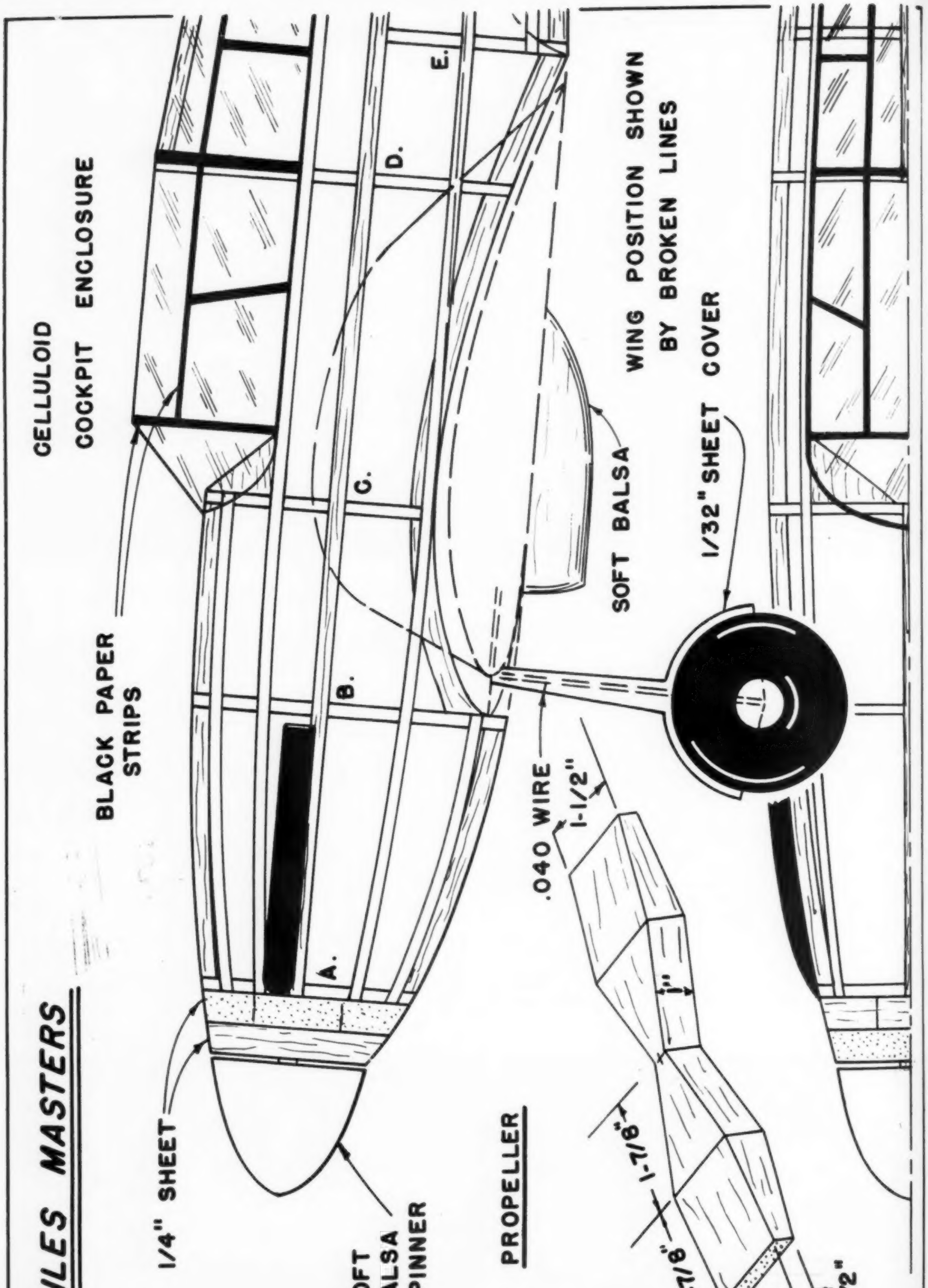
Before actual construction of the model study the plans carefully to become familiar with the details. With a clear picture of each detail in mind, gather all the necessary material and begin.

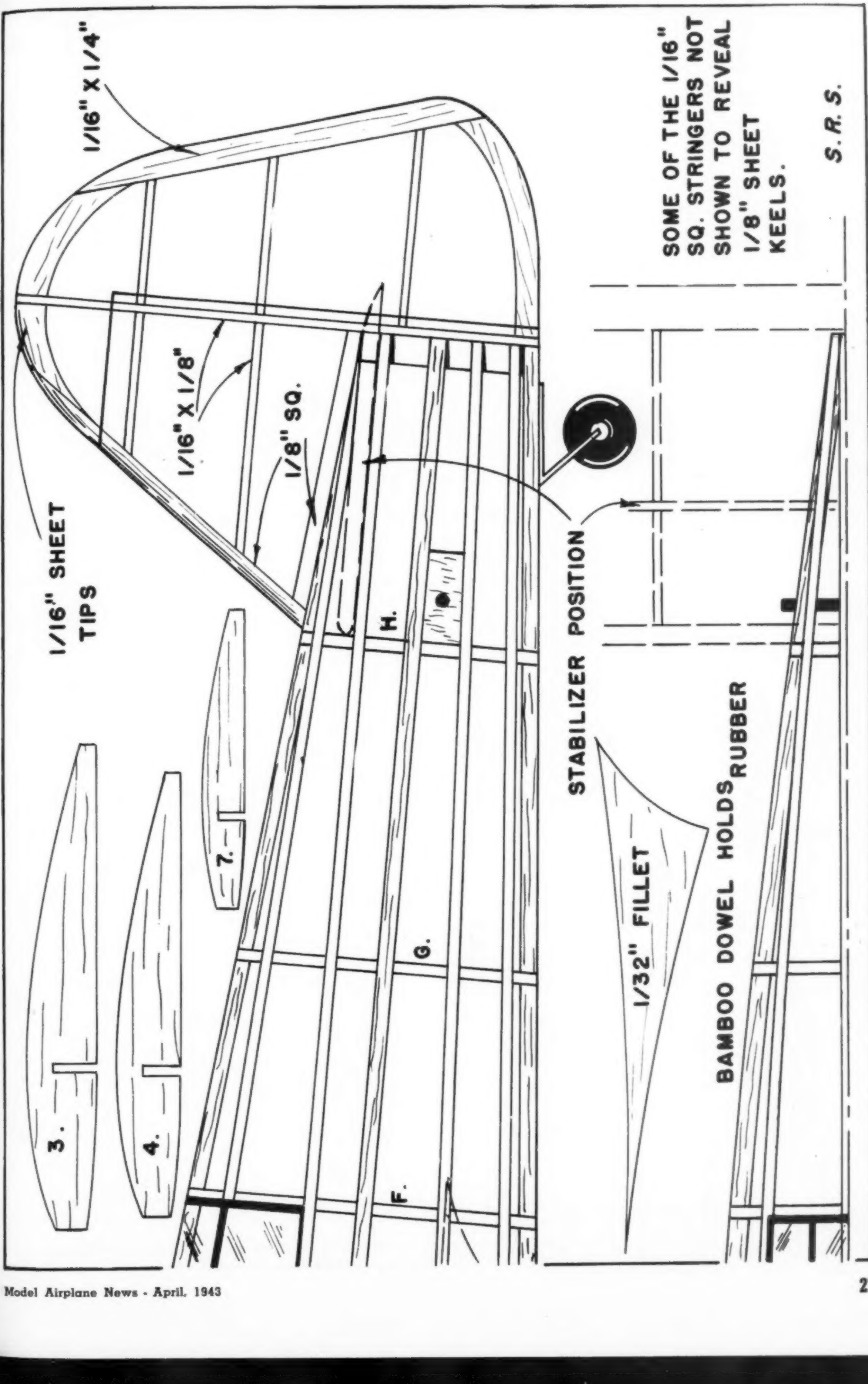
FUSELAGE: The manner of fuselage construction calls for use of four keels cut to the required shape from 1/8" sheet balsa. To obtain their patterns trace the top, bottom and side outlines of the body. The keels are shown in grain. Bulkheads are cut from 1/16" sheet to the patterns shown in

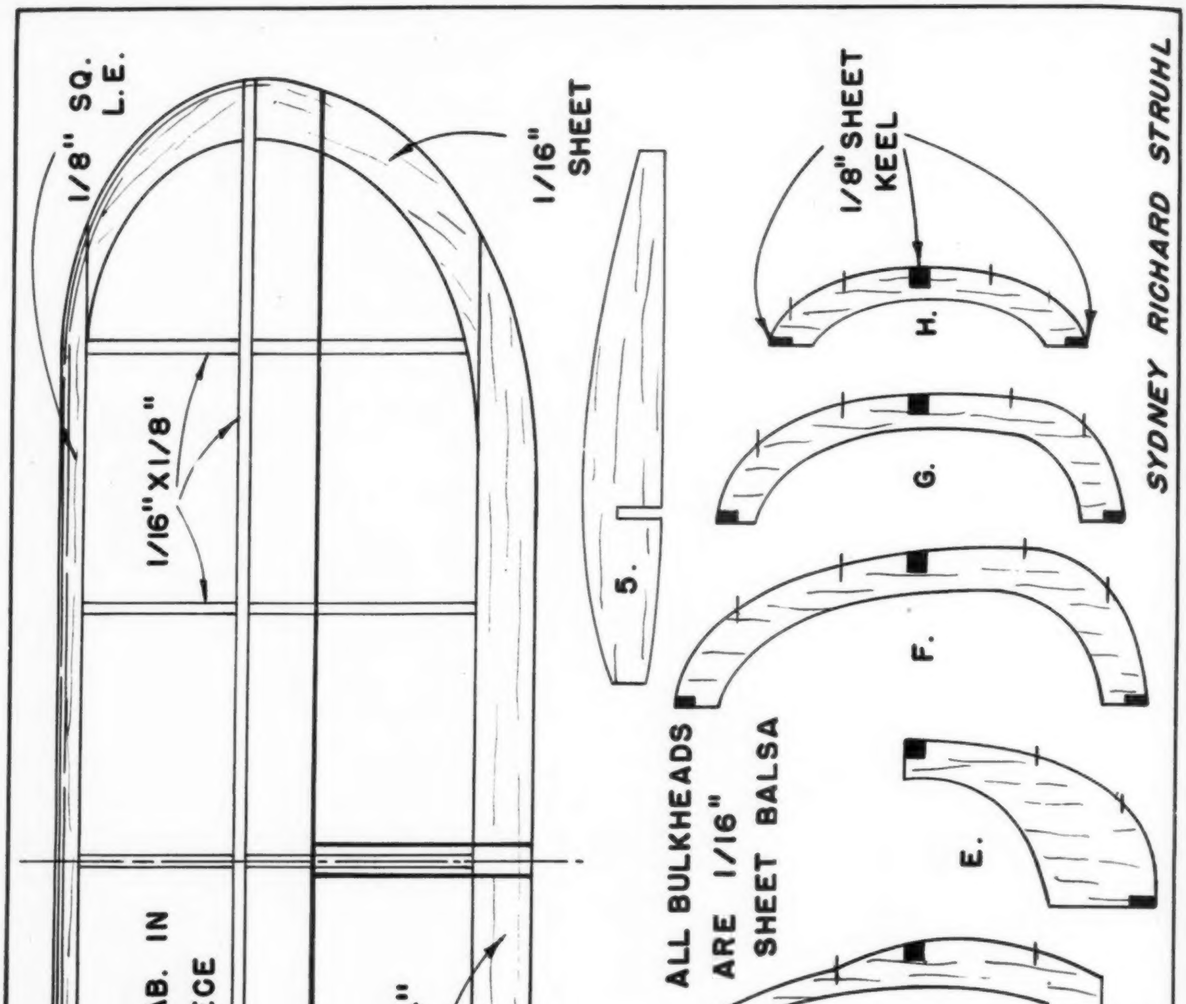
(Continued on page 31)

Carefully detailed, it is very realistic

A large propeller gives it fine performance


MILES MASTERS
1/4" SHEET
SOFT BALSA SPINNER
PROPELLER
BLACK PAPER STRIPS
CELLULOID COCKPIT ENCLOSURE
A.
B.
C.
D.
E.
SOFT BALSA
WING POSITION SHOWN BY BROKEN LINES
1/32" SHEET COVER
.040 WIRE
1-1/2"
1"
1-7/8"
1-7/8"
1/2"


1/16" X 1/4"
SOME OF THE 1/16" SQ. STRINGERS NOT SHOWN TO REVEAL 1/8" SHEET KEELS.
S. R. S.
1/16" X 1/8"
1/8" SQ.
1/16" SHEET TIPS
H.
G.
F.
STABILIZER POSITION
7.
3.
4.
1/32" FILLET
BAMBOO DOWEL HOLDS RUBBER



1/8" SQ. L.E.
1/16" SHEET
1/16"X1/8"
BUILD STAB. IN ONE PIECE
1/8" X 1/4"
1/16" SHEET
7.
5.
6.
ALL BULKHEADS ARE 1/16" SHEET BALSA
NOTCH FOR 1/16" SQ. STRINGERS
1/8" SHEET KEEL
A.
B.
C.
D.
E.
F.
G.
H.
SYDNEY RICHARD STRUHL

AVIATION ADVISORY BOARD

Answers to perplexing problems puzzling aeromodelers — have you a question?

How to Use Hardwood in Place of Balsa

EVIDENTLY Warren Adams Phinney of 415 William Street, Pittsfield, Mass., likes to get "to the bottom of things," for he has put before us a number of very pertinent and interesting questions pertaining to substitutes for balsa. We will attempt to cover all his points because we know that many other model builders are confronted with these same problems.

Question: What are the working and strength characteristics of pine as compared with balsa?

Answer: First of all, this indicates a very important misconception; that is, pine is mistakenly believed to be an excellent wood for stress-bearing members of model plane structure. Nothing could be farther from the truth and we wish to disillusion all model builders right here and now. *Never use pine for longerons, wing beams, struts, or any part of the structure that must carry loads or endure stresses.*

The use of pine in this category has been accepted by modelers who do not understand the problems, because pine in the past has been used for boat models and solid scale airplane models. This is quite natural and logical for this material can be used wherever model FORMS are created. In other words, pine is excellent as a modeling material where carving is required and no stresses are involved; where a bulk of material is to provide a given external shape. It is excellent for this purpose because it is easy to work, has uniform grain and has the characteristic of clay to a certain extent.

Many unacceptable materials have been used in the name of *white* pine, the best grade of which comes from Michigan, is uniform in texture, weighs about 26 lb. per cu. ft., and is quite soft compared to other hardwoods. Pine often used mistakenly is yellow pine or other harder or more resinous pines. Do not substitute these for white pine merely because they have the name "pine" attached to them. They are as different from white pine as hemlock, willow or other woods.

Now that we have told you what not to use for longerons, spars, etc., we would like to suggest a wood which has been found best in all phases of model work over a period of 20 years; namely, *basswood.* It combines the excellent working qualities of pine with the stress-resisting qualities of spruce. Its grain is quite uniform, it is strong but not too stringy for working. It is not as strong as spruce but sufficiently strong for use as stressed members in model structures. When steamed it is easily bent, and in years gone by has been used to make curved and varied-shaped wagon bodies. This speaks well for its toughness.

Spruce can be used for stressed parts but in small sizes be sure it is straight-grained, otherwise the parts will splinter and break easily. There is nothing stronger for its weight than straight-grained spruce; this heads the list. Basswood will prove to be a close second. Spruce is discarded usually because of its comparatively poor working qualities; when shaping it is difficult to prevent splitting and cuts along undesired lines because of its stringy grainy nature.

Now we reach a point where we can answer Mr. Phinney's second question.

Question: What sizes pine should be used with planes specified with balsa of various sizes, such as 1/16", 3/32", 1/8" square?

Answer: This is quite simple. First, no pine should be used; basswood should be used, the size being governed by the relative weights of basswood and balsa. Average balsa weighs 7 to 8 lb. per cu. ft., average basswood about 30; so, for 1/16" square balsa, use 1/32" basswood. This weighs approximately the same as balsa, though its strength in bending is slightly less. In compression or tension it is just as strong.

If bending is to be prevented between the struts or panels of the fuselage, for instance, a single sheet of tissue paper can be wrapped around the middle of the longerons giving 1 or 1-1/4 complete turns. About 1/2 the length of the longeron should be covered. This will give it added strength to resist bending. In place of 1/8" square balsa, 1/16" square basswood should be used (or spruce if more convenient).

The general rule to follow is: When hardwood is to be used for stringers the crossection should be 1/4 to 1/3 the crossection of balsa; the 1/3 value will give added strength yet will weigh very little more than the balsa.

When substituting hardwood sheet for balsa sheet, it is another story. The thickness of any hardwood sheet can only be reduced to 1/2 that of the balsa sheet. Therefore when hardwood sheet is used in place of 1/16" balsa sheet, for instance, it must be 1/32" thick. This will be nearly twice as heavy as the balsa sheet but nothing can be done about it as far as reducing the size of the wood is concerned, for reducing the hardwood sheet it would become too flimsy to use in similar manner as balsa. To use a thinner sheet would require added structural members to give it greater thickness, thus construction would be complicated and also increased in weight.

There is a way to reduce the weight of hardwood sheet however. When 1/32" basswood sheet is used in place of 1/16" balsa it is nearly twice as heavy, so the weight of the hardwood sheet must be reduced to half. This can be done by making cutouts

(Continued on page 58)

AIR YOUTH

(A Division of the National Aeronautic Association)

Official Model Airplane News prepared by R. W. Nichols

Learn to Fly Today . . . For Your Country and Your Future

WHERE can America get pilots for immediate military service?

To meet the tremendous demand for pilots at the time of America's entrance into the war, large training centers were constructed where instruction has been progressing at an increasing rate. But the Navy, realizing the importance of a longer period of training, has introduced aeronautical courses into the schools so that when boys reach the age at which they may enter Naval Service, they will have a background of knowledge to supplement their flight training and prepare them to understand the strategy of modern warfare and the utility of aerial transport. Thus the Navy inaugurated the Scale Model Building Project into the public schools throughout the United States in an effort not only to obtain 500,000 accurate model aircraft for immediate use in training its personnel, but to provide an incentive to every student, vastly increasing his knowledge as well as that of his immediate family regarding aircraft, and what they will do.

Again Academy headquarters urges AMA members, the most skilled and expert model building group of its size in the country, to contact their local schools and obtain plans for the Navy scale models. If your local school is not participating in the model building project, write directly to Dr. Robert W. Hambrook, U.S. Office of Education, Washington, D.C., or inquire from Academy headquarters for the name and address of your State Director of the Model Aircraft Project.

American model builders through actual building and flying of model aircraft and through instruction of less-experienced modelers can help train future pilots to maintain American air-supremacy.

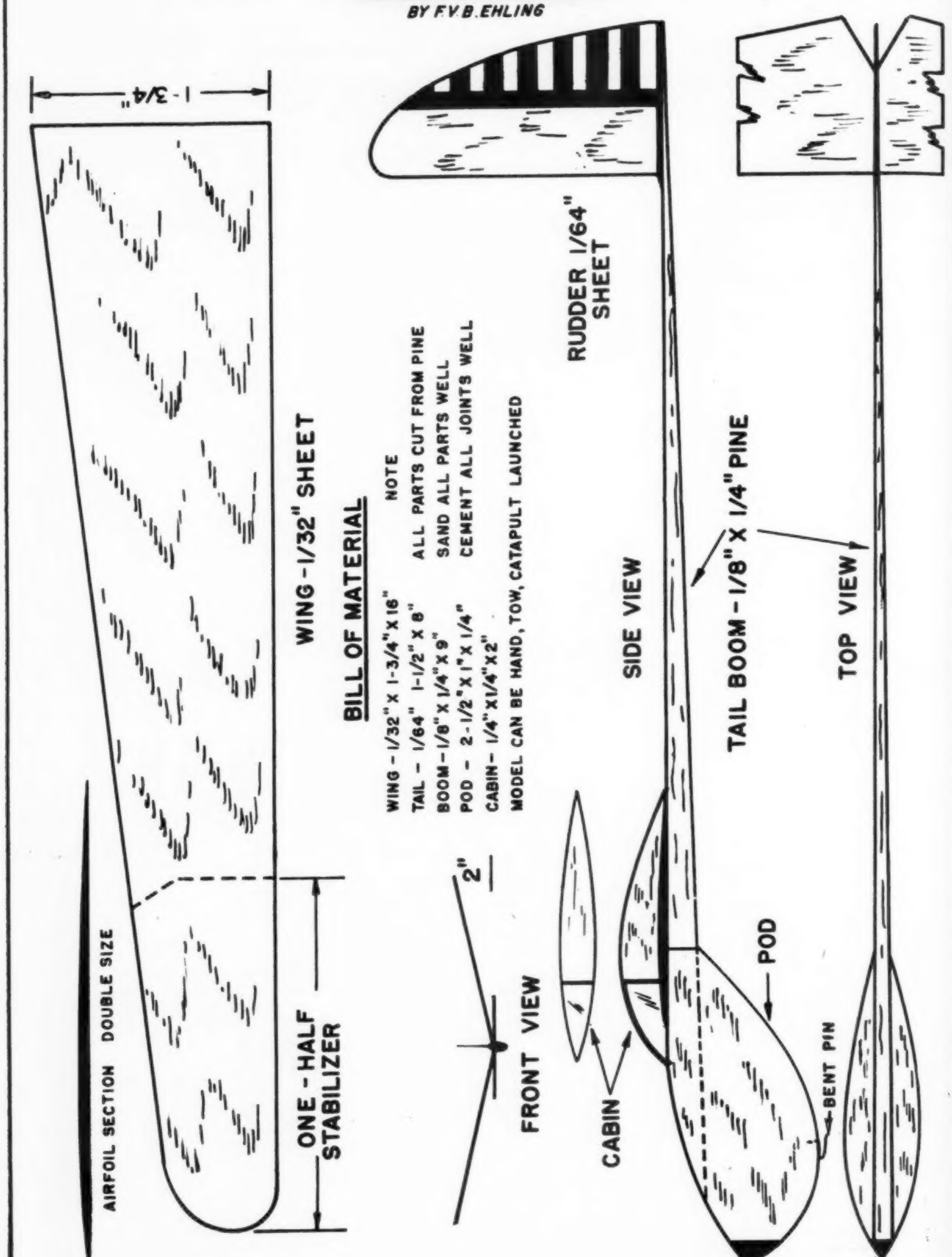
Now Is the Time to Fly

Because of existing transportation difficulties, restrictions on "non-defense" travel,

(Continued on page 50)

THE ALL PINE SOARER

BY F.V.B. EHLING



Fly This Miles Master

(Continued from page 25)

the plans. Cut only the notches for the keels, as shown, leaving the other to be cut as a later operation; their positions should be marked as shown for later reference.

Pin the top and bottom keels to position over the fuselage side view and then cement half the bulkheads in their proper locations. Attach a side keel and then, when dry, remove the structure from the plans and add the remaining bulkheads and keel. All stringers are 1/16" square balsa. Attach the ones nearest the side keels first, cutting notches as required. Always attach stringers to corresponding positions of each side of the fuselage at the same time to prevent pulling the body out of line.

Between bulkheads B and E, where the wing fits in, curved pieces are cut from soft 1/16" sheet and fitted so as to make the fuselage sides fit the wing curvature. Add 1/16" sheet to form the dashboard and in the rear of the fuselage to act as an anchor to hold the rubber motor.

The nose block, just forward of bulkhead A, is made from two pieces of 1/4" sheet. The first is removable but is held in place by a small cube that fits into the second piece which in turn is cemented to A.

TAIL SURFACES: Construction of tail surfaces is easy; both the rudder and the stabilizer are constructed in a similar manner. For greatest strength the stabilizer is made in one piece, so make a full size plan. Pin all stock directly on the plans. Dimensions are given in the plans. When dry remove the frames from the plans, trim and sand the surfaces to a final shape. Check against warps.

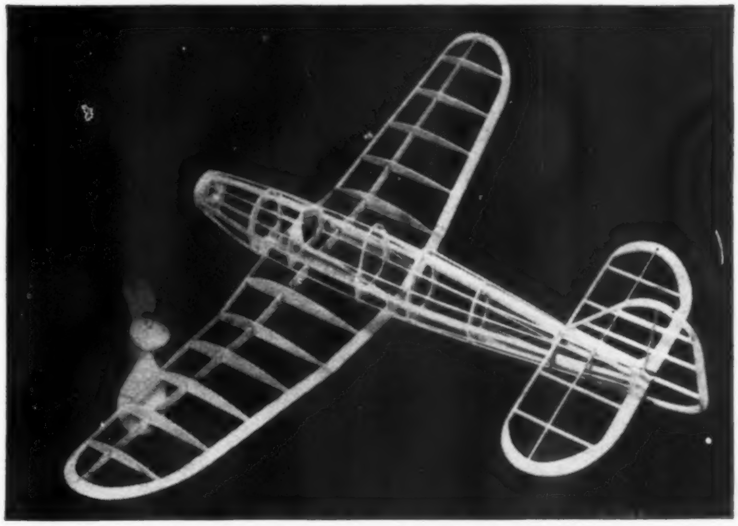
WING: The wing is made in one piece. Thus it will be necessary to make a tracing of the other half of the wing as space allows us to present only the right half. The entire wing frame is built over this full size plan and then cracked at rib 3 for the required dihedral.

Two of each type rib with the exception of No. 1 are required; all are cut from 1/20" or 1/16" sheet balsa. Notches for the spar must be cut with accuracy to insure a neat job. The leading edge and wing spar taper is shown by the broken lines.

Taper the trailing edges to correct cross-section before pinning them to place over the plans. Assemble the parts right over the plans using pins to hold them in place until the cement is hard. Tips are cut from 1/16" sheet to the correct shape and cemented in place. Trim the edges and tips to shape, finish with sandpaper. Crack at ribs 3 and install 1-3/4" dihedral under each tip.

LANDING GEAR: Landing gear struts are bent from .040 music wire which is bent so as to join the wing spar and rib No. 3. Be sure to make a right and left strut and then attach them to place with thread and lots of cement. Use a needle and thread to sew right through the ribs and around the wire. Apply several coats of cement to the entire adjacent area. The 1/32" sheet landing gear leg covers are not added until the wing is covered.

Lightweight wheels can be purchased or they may easily be made from scraps of 1/8" sheet balsa that have been laminated together. Washers or bearings should be attached to each wheel so they will turn freely and accurately.



The structure is light, strong and easy to build

PROPELLER: For best performance any flying model must have an efficient propeller. Select a hard balsa block 1" x 1-1/2" x 7-1/2" and cut the blank to the shape shown. Drill the tiny hole for the prop shaft then start to carve a right-hand propeller. Finish the back surface of the blades first, then cut away the front to the desired thickness. Round the blade tips similar to the prop shown in the photos. Use rough and then fine sandpaper to smooth and balance the blades.

The spinner is made in two individual pieces cemented to the sides of the hub. A free-wheel device should be attached to improve the glide and a bearing is cemented to the back so the prop will revolve smoothly. Apply several coats of clear dope with light sandings between each and then color dope to a smooth finish.

For the propeller shaft use .040 music wire. Place several washers between the prop and nose plug before bending a loop in the end into which a winder can be hooked.

COVERING: Before the frames are covered, carefully sand to remove all flaws and roughness. Either colored tissue or Silkspan may be used and banana oil or thin dope is the adhesive. Use individual sections of tissue for each flat section of each side of wing, tips, tail surfaces, etc. In covering the fuselage it will be necessary to use numerous small pieces to work around the curves without wrinkles; the tissue must be lapped carefully to assure a neat job. Lightly spray the covered parts with water to tighten the tissue. The flying surfaces must be supported level while drying so they will not warp.

Assembly of the Miles Master is simple. First fit the wing into the recess in the fuselage and cement firmly. If parts have been built with accuracy, the angle of incidence will automatically be correct. Finish the section from wing to fuselage with small pieces of 1/16" sq. Wing fillet patterns are given and two are cut from 1/32" sheet. They are to fit accurately from fuselage to wing and may need a bit of alteration to fit exactly on your model. If the builder desires, the trailing edge of each fillet may be strengthened by laminating another small piece of 1/32" sheet to the underside.

It will be necessary to temporarily cut the top keel behind H to admit the stabilizer which is cemented in position. Cement the rudder to place with a bit of offset to counteract torque. The stabilizer trailing edge may have to be cut a bit to allow the rudder to be in position. Tissue fillets are placed between the tail surfaces and fuselage. Any wrinkles in the covering should be moistened with water and permitted to dry before the entire model is given a coat or two of clear dope.

The model cannot be considered complete until numerous minor details are added. The cockpit is made of thin celluloid. When cementing the celluloid in place be careful to avoid cement smears. The structural detail is represented by doping thin strips of black tissue to the transparent enclosure. Wheels are colored and then held to the axles by small washers soldered to the ends. The outer landing gear covers are cut from 1/32" sheet and then covered with tissue to match the rest of the plan. Control surface outlines are simply thin strips of black tissue doped to place. Items such as tail wheel, exhaust ports, etc., are made from scraps. The British insignia is found on the wings and fuselage sides of the real plane, and can be made from colored tissue.

FLYING: The original model was powered by six strands (three loops) of 3/16" flat brown rubber. It is best to lubricate the motor before placing it within the fuselage. Hook the ends to the prop shaft and drop the other ends through the fuselage and hook onto the bamboo pin.

Before actual flight tests are begun the model should be made to balance at the 1/3 wing chord. Check the glide of the ship and correct any minor defects by warping the stabilizer up or down. Hand launch over deep grass or weeds observing in particular the glide and making any necessary adjustments. When a good glide is obtained, per-

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★ ★ There probably is no other war plane so much in the public eye or so much talked about as the magnificent "Flying Fortress" as built by Boeing. The Ott-O-Former 32 inch wing span model of this famous four-motored bomber follows the great ship faithfully and is a joy to behold and a thrill to build and fly.

This model requires more materials and considerably more construction work than most models of the same size yet it costs no more and the job of building has been made amazingly simple in this Ott-O-Former Kit.

BUILD IDENTOPLANES . . . IDENTIFY THE WAR PLANES!

THIS NEW SIZE contains material for making ten war planes in silhouette models—5 U. S., 1 British, 2 German, 2 Japanese. Reduced from Navy's authentic drawings. Complete Kit........25c

MODEL BUILDERS MATERIALS

Most dealers now have stocks of Joe Ott's fine quality model airplane cement and dopes. Colored dopes in red, blue, green, orange, white and black. Also clear dope and banana liquid (tissue cement). All in big three-inch jars..**each 10c**

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fect flights are achieved by offsetting the thrust line with slivers of wood between nose plug and nose. Increase the number of turns as flights improve. Treat the model with care until its flights characteristics are learned then try for long flights with a mechanical winder—and you can get them with your Miles Master.

VICTORY

Sky Scouts

(Continued from page 19)

are reprinted look them over and send us the names. In this issue the last installment of four sets with descriptions are given.

If you have formed units and hold meetings it will be helpful if you clip out the silhouettes or make copies of them and paste them on your bulletin board. In this way silhouettes of enemy ships will be constantly before you and it will not be long before you will become familiar with all their characteristics.

Although all twelve sets of silhouettes have been printed, answers to which are a requirement to become an Expert Sky Scout, Sky Scouts will not be discontinued.

Many units have been formed and they wish to carry on as spotters and become familiar with new warplanes and possibly many others that have not been printed in this column. So, each month a number of silhouettes will be presented in order that Scouts can "keep in their hand," so to speak, at identifying planes.

Scouts and Scout units are invited to write to Sky Scouts, MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City, telling of their activities and giving news which might be interesting to others. This will help the whole organization and make the work of all more interesting. Send in your interesting comments!

VICTORY

From Numbers to Names

Below is a listing of names (by the numbers) accorded official recognition by the Army and Navy as popular designations for American aircraft. For official use within the Army Air Forces, numerical designations will be retained. (Navy symbols are shown in parentheses):

Heavy Bombers

B-17	Flying Fortress
B-24 *(PB4Y)*	Liberator

Medium Bombers

B-18	Bolo
B-23	Dragon
B-25 *(PBJ)*	Mitchell
B-26	Marauder
B-34 *(PV)*	Ventura

Light Bombers

A-20 *(BD)*	Havoc (Attack)
A-24 *(SBD)*	Dauntless (Dive)
A-25 *(SB2C)*	Helldiver (Dive)
A-29 *(PBO)*	Hudson (Patrol)
A-34 *(SB2A)*	Buccaneer (Dive)
A-35	Vengeance (Dive)
(SB2U)	Vindicator (Dive)
(TBD)	Devastator (Torpedo)
(TBF)	Avenger (Torpedo)

Patrol Bombers (Flying Boats)

OA-10 *(PBY)*	Catalina
(PB2Y)	Coronado
(PBM)	Mariner

Fighters

P-38	Lightning
P-39	Airacobra
P-40	Warhawk
P-43	Lancer
P-47	Thunderbolt
P-51	Mustang
(F2A)	Buffalo
(F4F)	Wildcat
(F4U)	Corsair

Scouting Observation

(SO3C)	Seagull
(OS2U)	Kingfisher

Transports

C-43 *(GB)*	Traveler
C-45A *(JRB)*	Voyager
C-46 *(R5C)*	Commando
C-47	Skytrain
C-53 *(R4D)*	Skytrooper
C-54 *(R5D)*	Skymaster
C-56 *(R5O)*	Lodestar
C-61 *(GK)*	Forwarder
C-69	Constellation
C-76	Caravan
C-87	Liberator Express
(JR2S)	Excalibur

Trainers

PT-13 & 17 *(N2S1 & 3)*	Caydet
PT-19 & 23	Cornell
(N2T)	Tutor
PT-22 *(NR)*	Recruit
BT-13 & 15 *(SNV)*	Valiant
AT-6 *(SNJ)*	Texan
(SNC)	Falcon
AT-7 *(SNB2)*	Navigator
AT-8 & 17	Bobcat
AT-10	Wichita
AT-11 *(SNB1)*	Kansas
AT-13 & 14	Yankee-Doodle
AT-15	Crewmaker
AT-19	Reliant

Liaison

L-1	Vigilant
L-2	Taylorcraft Grasshopper
L-3-C	Aeronca Grasshopper
L-4-B *(ME)*	Piper Grasshopper
L-5	Sentinel

—Courtesy of AIR FORCE.

Description of Silhouettes

(Continued from page 19)

is 280 mph., and range is set at 3,100 miles. The normal crew of the ship number five: two pilots, two gunners, and a navigator-bombardier. Armament on the ship is relatively poor. Only two gun stations are used; one at top of the fuselage aft of the wing, another beneath the fuselage in the bomb belly. Span 81 ft. 4 ins.; length 60 ft. 4 ins.

PLANE 10C—The Blohm und Voss Bv 222 long rang patrol boat designed before the war as a transoceanic transport but later converted into a patrol boat. Powered by six 1,000 hp. BMW 132 De engines, the craft is capable of about 200 miles per hour. Since its conversion, multi-gun turrets have been stationed in the tail, nose and sides of the hull. Span 150 ft.; length 112 ft. Little information has been assembled on this craft to date; however, when more information infiltrates from Germany it shall be made available.

PLANE 10D—The Henschel Hs 129 single-seat close support fighter-bomber recently coming into squadron service and used mainly for ground attacks. The craft is powered by two 450 hp. Argus As 410 engines and is capable of speeds up to 225 to 250 mph. at low altitudes. Its armament consists of two cannon and four machine guns all concentrated into the nose of the craft. Span 50 ft.; length 38 ft.

PLANE 11A—The Breda 88, two seat fighter-bomber powered by two Piaggio P X1 C. RC 40 air cooled engines, each developing 1000 hp. The '88' is a heavily armed all metal, stressed skin airplane capable of 320 miles per hour at slightly over 13,000 ft. Service ceiling is 28,000 feet; maximum range, 1,000 miles. It carries two 20 mm. cannon and two .50 calibre machine guns mounted in the fuselage nose. Another gun is located on a swivel mount in the aft cockpit. The plane has a wingspan of 50 ft. 10 in.; length, 37 ft. 9 in.

PLANE 11B—The Henschel H.S. 122 two or three place general purpose airplane used by the Germans. Powered by a Bramo SAM 22B 600 hp. engine, it is reported to have a maximum speed of 165 mph. range of 375 miles, service ceiling of 21,650 feet. Weight, loaded, is estimated at 5,600 lbs. Wingspan is 47 ft. 6 in.; length, 33 ft. 1½ in.; height, 11 ft. 1¾ in. The plane is adaptable to observation work as well as training of bombing and navigation personnel.

PLANE 11C—The Macchi C 200 single seat all metal low-wing fighter used by the Italian Air Forces. It is powered by a Fiat A 74RC 38 engine developing 840 hp. The craft is poorly armed, having only two large calibre machine guns mounted in the fuselage forward of the cockpit. Light bombs are also carried in the fuselage. Top speed is slightly over 300 mph. at 15,700 feet altitude and a range of 435 miles. Service ceiling is 31,000 feet. The wingspan is 34 ft. 8 in.; length, 26 ft. 10 in.; height, 11 ft. 6 in.

Plane 11D—The Breda 65 attack-bomber powered by a Piaggio P. XI twin-row 1,000 hp. engine. It is armed with two 12 mm. and two 77 mm. guns in the wing as well as a flexible gun in the aft cockpit. The '65' has been used extensively for ground strafing. Speed is 255 mph at 16,400 feet and a range of 680 miles. Service ceiling is 25,900 feet. Span, 39 ft. 8 in.; length, 31 ft. 6 in.; height, 10 ft. 11 in. Rate of climb, 1,380 ft. per min.

PLANE 12A—Caproni Reggiane RE 2001 single place fighter powered with an 1,150 hp. Mercedes-Benz DB 601 N engine. It has a span of 36 ft. 9 in., a length of 29 ft. 3 in. Very little information is known of the ship except that it is capable of speed of 348 mph. at 22,000 ft. altitude. According to reports reaching us from the African front, the RE 2001 is giving an excellent account of itself, which indicates German ideas must have infiltrated into Italian aviation.

PLANE 12B—Caproni Reggiane RE 2000, single plane fighter and forerunner of the "2001." Power is a 1,000 hp. Piaggio P XIR C 40 radial engine. The 2000 is similar to its successor with respect to dimensions and performance although it possesses a speed of some 30 miles less than the later model. Outstanding difference in the planes lies in the motor installation. The craft is armed with only two machine guns of large calibre. Although lacking in firepower, it makes up for this in maneuverability. It is reported that repeatedly in sham dog-fights with Messerchmitts Me 109s, the Italian fighter was superior.

PLANE 12C—Focke-Wulf FW 58 Weihe, twin engine bomber trainer powered by Argus As. 10C eight cylinder engines each developing 240 hp. It is fully equipped to accommodate complete bomber crews; gun installations, radio facilities and navigation instruments authentically simulate conditions to be experienced in bomber flying. The FW58 has a 68 ft. 10 in. span; 46 ft. 3 in. length, and wing area of 506 sq. ft. Top speed is estimated at 160 mph., service ceiling at 17,715 ft.

Timer's Nightmare

(Continued from page 13)

rest is cemented in place; this is used in order to keep the tail from wobbling in flight. Cover and water dope; set aside to dry.

The wing is very simple to construct. Cut the ribs out along with the spars and wing tips and assemble. As the wing section is flat there will be no trouble in construction; after which the wing gussets are added. These are used to maintain the dihedral in the wing. Add the wing tips and go over the whole wing with sandpaper so the wing will be smooth in order to get the covering on smoothly. It is best to cover the wing with Silkspan and apply it wet to the wing. This is done

in order to get the covering on easily.

The stabilizer is then made in the same way except that there is no dihedral. Cover the stabilizer in the same manner and put it aside to dry with weights to prevent any warps that might occur.

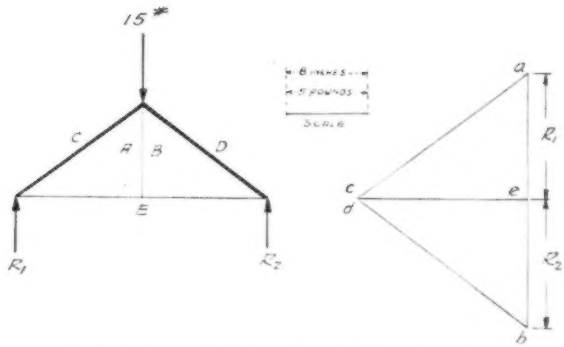
The rudder is then cut out of sheet and sanded to a streamlined section, after which it is cemented to the stabilizer. A former similar to the one that is at the rear of the fuselage is cemented to the front of the rudder. When this is dry the rudder is covered; include this former in the job as that is how the rudder fillet is formed, thus forming the rear section of the fuselage.

The whole model is now given a coat of clear dope. After this dries the second coat should be applied, but it is best to brush the dope opposite to the first coat, in this way there is less chance to miss any spots. The colored dope can now be applied; this is best done if the dope is thin. After two coats are applied the model can be rubbed down. A good trick is to get a damp cloth and a little Bon Ami and start to go over the whole plane as if it was dirty. In this way the covering will not be cut through in any spot like sandpaper will sometimes do if extreme care is not exercised.

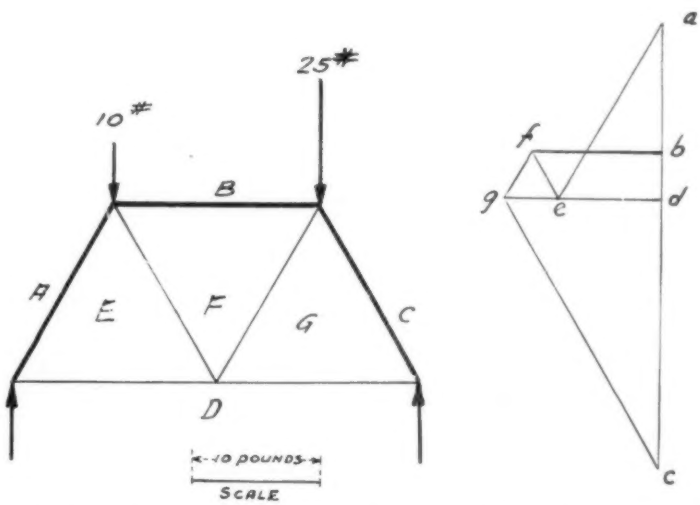
Test flying this ship will need no explanation to talk about: simply glide the ship till a good glide is obtained, add a little negative to the tail if the ship seems nose heavy. Start the motor and set the timer for about five seconds, observe the flight and glide to see that the ship is circling opposite the glide.

This ship, despite its cost, should give you plenty of fine flights as the original is still going strong and the only trouble that was encountered was to recover one section of the wing.

VICTORY



8. Graphical solution of a King Post truss. Scale of distances: 1/2" equals 8 in. Scale of forces: 1/2" equals 5 lb.



9. Graphical solution of a Warren truss. Scale of force diagram: 3/4" equals 10 lb.

Stressing Your Gas Job

(Continued from page 15)

The graphical solution of beams, such as wing spars, wing ribs and other component parts of model airplane structures, involves construction of shear and bending moment diagrams. A beam loaded as shown by Fig. 6 is treated by first solving for reactions R_1 and R_2 by means of a force polygon drawn to an arbitrarily selected scale of 5 lb. per in. The pole O is selected at an arbitrarily chosen distance, equal in scale to 15 lb.; rays are then drawn. As in previous examples, the force polygon is described by reproduction of lines parallel to rays of the force diagram along the lines of action of original forces. The closing line of the force polygon determines, to scale, the magnitude of the reactions when reproduced on the force diagram as shown. The sheer diagram, indicated by shaded section of the figure, is constructed by drawing to scale the shear along the line of action of the left-hand reaction R_1 at which point shear is equal to reaction, or of a magnitude equal to 8.78 lb.

Moving horizontally to the right, the shear of 8.78 minus 5.00 to 3.78 lbs., is reached along the line of action of the 5 lb. load. This continues to the 10 lb. load, at which point the shear is represented by 3.78, minus 10.00, or -6.22 lb. This last amount continues to the line of action of the 1 lb. load where is becomes -7.22 lb., the amount of the right-hand reaction.

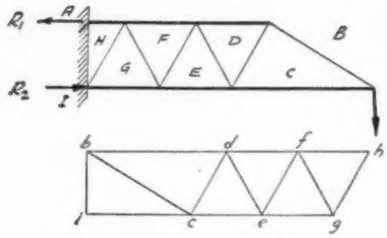
The moment diagram or equilibrium polygon, shown beneath the shear diagram, indicates bending moment in foot-pounds at any point along the beam by the height of the corresponding ordinate. The scale of the moment diagram is determined by the product of the scale to which the beam is drawn, and the polar distance (distance from the pole or point of origin O to the load line of the force diagram). The maximum bending moment, indicated by the longest ordinate, occurs along the line at which shear changes in value from positive to negative, and is of magnitude 15 times 6, or 90 lb. per in. of ordinate.

Trusses are, in effect, compound beams, members of which are arranged to form one or more triangles in the same plane. Truss members are subjected only to longitudinal stresses, i.e., tension and compression. As a general rule in bridges and similar truss structures, top chord members act in compression, while bottom chord members are subjected to tension. In cantilever trusses stresses are reversed. This reasoning however does not necessarily apply to airplane truss structures which are subjected to varying forms of loadings. Web members, defined as intermediate vertical and diagonal truss members, are acting in compression or tension, depending on their position and type of truss in which they are placed. Secondary diagonal members, termed counters, are placed in the panels of an indeterminate truss in order to prevent a reversal of stress in the web members upon application of a load. The most commonly-used types of trusses are illustrated by Fig. 7. Their designation is:

a. King Post Truss; b. Queen Post Truss; c. Howe Truss; d. Pratt Truss; e. Warren Truss.

Compression members are indicated by heavy lines, tension members by light lines, and counters by broken lines.

Stresses in truss members can be determined graphically by laying off known forces acting on the truss to some selected scale on the vertical load line of the force diagram. These forces are treated consecutively in the order they occur in going around the outside of the truss. The load line for a King Post truss is shown by a-b of Fig. 8, the single force AB being thus represented. Since AB is a central load, reactions R_1 and R_2 are equal and of magnitude AB/2, as they are designated on the load line. The stress diagram is completed by drawing a-c, parallel to AC from point a, and c-e parallel to CE in the same manner. The point of intersection of a-c and c-e marks the point of closure of the force



10. Graphical solution of a Cantilever truss

polygon because the forces represented are in equilibrium. The stress in member AC is determined by the length of the line a-c to previously selected scale, and similarly for member CE. The remaining section of the truss is solved in the same manner, because these members will develop stresses identical to those to which the foregoing members have been subjected, due symmetry of the structure.

Mathematical computation of the above stresses is given in order to check the graphical solution.

$$R_1 = R_2 = \frac{15}{2} = 7.5 \text{ lb.}$$

Length of the top chord member AC =

$$\sqrt{12^2 + 9^2} = 15 \text{ in.}$$

Since the vertical component is 7.5 lb., the axial stress in member AC = 7.5 × 15/9 = 12.50 lb. (compression). The horizontal component of this force is counteracted by the stress in member CE which is:

$$12.50 \times 12/15 = 10.00 \text{ lb.}$$

Member AB carries the full load, 15 lb. Loading and figure are symmetrical. Stresses of corresponding magnitudes apply to members BD and DE.

Fig. 9 illustrates method of graphical solution of a Warren Truss, used in aviation construction. The solution, by graphical methods of a cantilever truss, is shown in Fig. 10. Combination of capital and lower case letters used in all foregoing problems is consistent with Bow's Natation; this is a conventional system of lettering employed to simplify transfer of quantities from the space diagram to the force diagram. The area between the line of action of one force and that of its adjoining force is designated by a capital letter. When the quantities are transferred to the force diagram each respective vector is identified by the corresponding lower case letter which is placed at its extremity.

The following glossary of mechanics terms and definitions should prove helpful as we progress with our subsequent work in stress analysis of model airplane structural members.

STRAIN: amount of deformation or change of form produced in a member by application of an external force.

STRESS: internal force produced in the member, which serves to resist strain.

MODULUS OF ELASTICITY: ratio of unit stress to unit strain.

YIELD POINT: concerned only with ductile materials; the point wherein occurs a sudden and considerable increase of strain without an appreciable increase of stress.

ELASTIC LIMIT: value of unit stress below which the deformation or strain disappears completely upon removal of the external load, no permanent set being perceptible.

ULTIMATE STRENGTH: ratio of external load required to rupture the test specimen to the original area of cross-section of the specimen.

POISSON'S RATIO: expressed by the condition wherein ratio of transverse unit strain to unit change in length becomes practically constant.

RESILIENCE: energy expended in performing work required to produce a strain corresponding to that encountered at the elastic limit.

STRESSES are classified as (1) simple, (2) compound and (3) combined.

SIMPLE STRESSES include compression, tension and shear. These stresses are represented by the formula:

$$s = \frac{P}{a}$$

where s represents unit stress, P represents applied load, and a represents the cross-sectional area of the member subjected to the load P.

COMPOUND STRESSES include bending, buckling and twisting. These are combinations of the three simple stresses, for instance, bending includes both tension and compression. Bending stresses are represented by the formula:

$$s = \frac{Mc}{I}$$

where s equals unit bending stress, M equals bending moment produced by a load P, c equals distance from neutral axis of the section to its outermost fiber, and I equals the moment of inertia of the structural member subjected to bending. Twisting or torsional stresses are represented by the formula:

$$s = \frac{Tc}{J}$$

where s equals unit stress, T equals twisting moment produced by an applied load P, c equals distance from c.g. of the section to its outermost fiber, and J equals the polar moment of inertia of the structural member involved.

COMBINED STRESSES are the result of two or more of simple or compound stresses being developed with the same member as, for instance, bending and compression in an airplane wing spar.

FACTOR OF SAFETY is a relation derived by selection of only a fractional part of the ultimate strength of a material, as the working stress, to provide for a margin of safety in the proposed design.

It is rather difficult to apply graphic methods of stress analysis to wing ribs because of variation of the load along the chord, and also because of change in the rib section and shape. However, in the instance of the truss, Warren and Pratt trusses are used to complete the space framework of model airplane fuselages, and also the drag bracing of wings when necessary. Only half the fuselage need be analyzed as it is assumed it is symmetrical about the centerline. While the graphical method is not used for full scale structures, the method of solution of parallel forces, to find the bending moment, and to determine the shear, will be of value to the model airplane engineer who must meet some particular strength-to-weight ratio.

VICTORY

Air Ways

(Continued from page 21)

his Grumman F2F-3 of 15 1/2" wingspan. The many interest details include a retractable landing gear and tail wheel, sliding cockpit cover, leather upholstered seat and a detailed scale twin-row motor, which is revealed by removing the detachable cowling. Rosenman also has found time to join the Sky Scouts and acts as a spotter.

Picture 4 shows a beautifully built Baby Shark U-control gas model, built by Andrew C. Mortensen of 44 Hare St., Stratford, Conn. The photography as well as the workmanship on the model is excellent. Mr. Mortensen says he has had 6 flights to date, averaging 60 mph at half-throttle. The plane is powered with an Ohlsson "23" and has a Navy paint job of blue and gray. Mr. Mortensen has been building models for the past 10 years and is now putting his knowledge to work at the Vought Sikorsky Aircraft Co. where he is employed. He is now working on an 18" U-control model of a Howard Hughes racer powered with an Elf engine. Readers can look forward to seeing this little ship in Air Ways soon.

Modern ships usually have such clean unbroken lines that scale model builders often prefer the older types with strut wires, etc., requiring more detailed and careful workmanship. When finished the latter certainly make an excellent appearance and show off the builder's craftsmanship to good advantage. Such a model is shown in picture 5; a Waco C-6 built by Richard Bambach of 5914 Dover St., Oakland, Calif. It has a span of 15" and wings ribs are spaced to scale.

Amateur photographers should take special note of this picture; it shows unusual detail for a snapshot. It was taken indoors without artificial lighting. Others may follow Mr. Bambach's procedure with good effect: merely draw down a windowshade on a sunny day so that the sunlight filters through into the room and on the object. Place the ship on a table in front of the shade and take the picture. The exposure of this shot was 48 sec. with a stop of 45f. The shade was drawn over the table so that it also served as the "floor" on which the model rests.

A gas job of unique and excellent design is shown in picture 6. It was built by James W. Boyd of 5700 Fairoaks Ave. and sent to us by his friend, Robert W. Seidel, 5612 Birchwood Ave., Baltimore. It has several unique design features: first, the drooping stabilizer with wire loops at its tips to hold the model upright when resting on the ground; second, its single forward wheel which is partially streamlined at the long nose cowling; third, the low side or lateral area. From its design we would predict that it flew well under all weather conditions and flight attitudes. Such is apparently the case, for Seidel says that it flew beautifully on its very first flight when there was a wind. It is of original design, has a 6'

span, 11" chord, length of 56" and weighs 3.7 lb. powered by a Brown B Jr. inverted engine.

Formerly we had thought that all possible designs for gas models had been exhausted, but apparently we were wrong, for picture 8 shows one we have never seen before. Not only is it unique in appearance but also in construction. You will note that the fuselage is a flat-sided box slightly pointed at the rear on which is mounted a pylon supporting the wing, engine, landing gear and tail boom. It looks very neat indeed but that is not all: its most unique feature is the fact that it has been built around a fishpole. We will let its builder, Mr. M. D. King Jr., 311 Carter Building, Hattiesburg, Miss. tell you about it. He says:

"With balsa and other materials getting scarce, I decided to try to utilize anything I could find around the house to build a model with. I am a fisherman in the spare time I am not working on model airplanes, and I had several old fly rods laying around. The first joint of one of these old rods was just the right length for a Class B gas model, and seemed rigid enough to serve as a boom fuselage. The handle part was made of cork, which was light and would adhere to balsa, so I drew up plans for a model using the fly rod as a starting point. The pod was made of balsa, and housed the entire ignition system, which with the battery box provided with a hinged door set flush with the bottom of the pod. The timer shows in the picture to the rear. The tail assembly is mounted on a small platform which is prevented from twisting by two pieces of 1/16" wire running horizontally through two holes drilled through the end of the rod. The rod is made of very hard cane, and will not split or twist. Wing, tail assembly, and motor mounts were the usual construction.

"The finished model weighs 24 oz., with a 10 oz. wing loading on a 46" wing. I powered it with an Ohlsson 23, and it performs just as good as any contest model I have ever had. It does not have a tight corkscrew turn, but comes out on top without the loss of any altitude from a very steep climb, and does around 1 minute 30 seconds on a 15 second motor run without the help of risers. I have not tried it in the middle of the day, and do not know how it will ride the thermals.

"Everyone is stressing the use of substitute materials now, and I felt this model built around a fishing pole might prove interesting. It looks fragile, but the fly rod fuselage will take a harder blow than a regular type fuselage without breaking or twisting."

Robert Keyes of Brigham City, Utah, sends picture 10, showing him with his unique U-control Manta gas model. He says:

"I am a sophomore in college majoring in aero engineering, and I have to thank M.A.N. for providing me with my initiative in this field, as 'it got me' interested in building models."

The ship is an original design with 30" span, U-control, patterned after the Manta fighter. Tail surfaces are constructed of 1/8" sheet while the rest of the plane is covered with 1/16" throughout. Power is supplied with an Ohlsson "60" Custom motor mounted radially upright swinging a 14" prop. Speed is better than 75 mph with 75 ft. lines. Keyes continues:

"I have had many strange experiences with U-controls. One time last summer I was flying a control plane owned by Lieutenant R. B. Clay of our Army Air Forces. A fairly high wind was blowing and as the ship turned into the wind, the outside half of the wing broke off and fluttered to the ground. You can imagine my surprise, but the ship still kept flying with half its wing. However, it fluttered so badly as it pulled around into the wind again that I could hardly keep my hold on the controls. After four complete circles flying thusly, the plane got out of control and crashed.

"I should appreciate to hear of other fellows' experiences with U-controls in MODEL AIRPLANE NEWS."

Stan Staples of 220 Broadway, Chico, Calif. sends us picture 9; another of his beautiful jobs, a Bell P-39 mounted on a tricky display stand. It is built to a scale of 3/4" equals 1 ft., carved through and filled in with balsa with the exception of the control surfaces; these are covered with bamboo paper to simulate fabric. It required about 250 hours to make. Staples says: "After filling with balsa I applied a wood filler, then sanded it smooth. The finish is the regular Army dull olive on top and sky blue on the underside."

Staples has done such an excellent job that the Commanding Colonel at the Chico Army Basic Flying School has asked to have this and Staples' other models on display in his office.

Picture 7 shows a tricky gadget made from a fountain pen by Nathan A. Gainen of 2850 Ocean Avenue, Brooklyn, N.Y. It is a combination knife and pencil for model plane makers. The blade is a discarded Shick Injector razor-blade and the rest of the unit is an old worn-out pen-pencil combination. Many cheap combinations become useless in a short time but they may still serve well in the capacity indicated in the picture. Merely remove the pen part and place a razor-blade between the two halves of the wood block and insert it in place in the pen portion. The blade is of fine steel and interchangeable blades of fine cutting steel may be used. The pen-cap screws in place over the blade so that it may be carried conveniently in the pocket without damage.

It pays to do a good job, or at least Gordon M. Lambrecht, 5829 S. Christiana Ave., Chicago, thinks so. He is shown in picture 12 holding his Douglas DC-3 detailed scale model built in 1939. Since then the ship has been rented many times for display purposes and has won many prizes, amounting to over $300. This is no ordinary scale model: it has a 43" wingspan with the structure in careful detail, just like the big ship, having bulkheads in the body and

13. Charles Fox's neat American Ace gas model.

14. A Curtiss-Wright Model Club contest in full swing at Columbus, O.

the same number of ribs in the wing. It is covered with aluminum .0025 thick. The doors open and close, it has seats, cabin, landing and flying lights and also indirect lighting on the dashboard. Controls are operable, also the landing gear folds up. The engines are built up of aluminum and have as many parts as can be put on an engine of this size. It required 300 hours to construct at a total cost of $20.

Mr. Lambrecht says that the information sent in on his 14' glider, picture of which appeared sometime ago, was incorrect; he will be glad to supply the correct information. This will be printed later.

Curt Holzhauser of 560 Ramsell St., San Francisco, Cal. sends picture 11 in which he holds his second-place winning Zipper with floats. He belongs to the Frisco Vultures, as you can note by the name on his shirt. At one of their recent meets he obtained 10 successful takeoffs without "dunking," out of 10 attempts. Those familiar with hydro operation will realize what a fine performance this is. The floats are unusual inasmuch as they are of the triple float type, 2 in front and 1 at the tail. His average time for 2nd place was 1:30 min.

Canada

We hear from Charles Fox of 793 Argyle Rd., Walkerville, Ont., Canada, president of the Windsor Model Aircraft Club. Evidently activities are still going on in Canada, so we pass on some of the news he sends:

"Our organization, the Windsor Model Aircraft Club, which in normal times has about thirty-five members, averages about ten now at the weekly meetings. Most of the fellows are in the Airforce, a few are in the Army and the rest are working in war plants which prevents them from coming down.

"As yet we are not too hard up for supplies, a small amount of balsa is still available. New motors are a thing of the past, although a few second-hand ones are still in circulation. Nearly all the gas-modellers, including myself, have been forced to cut up the rubber in their Wakefields in order to get enough to put the wings on their gas-jobs.

"The club sponsored two contests in 1942. One fairly large, (not by U.S. standards,) and a small club contest. Our secretary, Bill (Head-Wind) Clapper has given a description of the big contest, and the small one hardly deserves mention; however, Fred Caton took first; yours truly, second; and Don Tannyson, third.

"The club has also put on two displays in Willistead Public Library in Windsor.

"All outdoor flying is over, and several new gas jobs are setting around waiting for Spring.

"Fred Caton, our local 'Superman,' hooked one of our terrific Canadian thermals and made a half-hour flight. He chased the model and recovered it about ten miles away. This worried him a bit, and he began to consider a de-thermalizer. Later he lost it again; this time the police returned it. This settled the question and he installed the de-thermalizer, and ventured out to the field in the middle of November to test it. He decided to make a flight first to see how the old crate was flying, hooked another thermal and away she went. Fred chased the model north to the Detroit River and watched it disappear from sight on the other side. We would like to ask all Detroit modellers to be on the lookout for a Red Cleveland Senior Playboy, well patched, powered by a Brown D engine. Motors are scarce over here and we would like to get this one back, even if it is about four years old."

Fox sends picture 13 showing his 54" American Ace powered with a 3-year-old Ohlsson "23." This is a nice looking job and flies well.

Michigan

We have a letter from Charles Williams of 3807 Branch Rd., Flint, which speaks for itself, as follows:

"Just a letter to let you know that I owe you a lot of 'thanks.' I have found that MODEL AIRPLANE NEWS is an invaluable aid in building models in my 'spare time.' I received a telegram recently and I was offered a duration job at Langley Field, Va., as an Under Aircraft Model-maker—thanks to you.

"And don't think for a minute that I'm going to turn this job down. No sir, I am leaving immediately to build 'em for Uncle Sam!

"I spent my Christmas vacation in Great Bend, Kansas, and the fellows down there are still going strong as far as flying gas models are concerned."

Illinois

From Charles J. Hein, director of publicity, we have just received a copy of the Skywolves of Des Plaines rules and regulations governing competition for control-line model planes. Mr. Hein says:

"The rules have proved fairly successful in the Chicago area and if any readers of MODEL AIRPLANE NEWS would like a copy of them for possible use in control-line contests we will be glad to send a set if they will write me, enclosing a 3c stamp covering return postage."

The complete set of rules would be published in M. A. N. except that they are very long and cover all kinds of events. They are well worth having.

CONTEST NEWS

Ohio

We hear from Robert James of 1680 Williams Rd., Columbus, who sends us picture 14, showing a scene at one of the contests at Columbus, sponsored by the Curtiss Wright Model Club. He says these contests are run in an unusually efficient manner; timers are always available although there are many contestants. The picture shows Lawrence & Sam James, with two of their models, in the immediate foreground.

James wants to know if gasoline rationing is going to stop gas model flying. That is a question we would all like to answer; probably gasoline will be available for model flying but that is the smallest part of it. How are you going to get to the flying field? That is the question! Probably by good old leg-power, unless model builders can figure out some way of powering road vehicles with their model engines.

New York

On December 11, 1942, the Annual Meeting of the Schenectady Aeroneers was held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at the Mont Pleasant High School with twenty-five active members and one member now a Naval Pilot present. At this meeting awards for the year and election of officers took place. One of the highlights was the sudden appearance of an indoor model with a streamer, "Pearson for President," in tow which caused quite a stir among the members.

Awards were given for achievements in the year past. A beautiful calendar in ten colors made by Mr. Pearson was awarded to those earning their Pilot rating. To qualify for this rating the member must make three official flights of one minute or better. This is one qualification each member must make during the year. Each member to receive this calendar had his qualification shown in the upper left-hand corner. Other awards were given to:

Robert Flood—Club cup for high point winner.

Albert Reed—John Schneider Trophy for night flying.

John Schneider—Rating of Ace Pilot for flights of five minutes or better.

Robert Flood—Rating of Ace Pilot.

Our Club Advisor, John Schneider, much to the delight of the members, then showed films in technicolor he had taken of the club's activities throughout the past years. Officers for 1943 are:

Aubrey Pearson, President; Harold G. Bradish, Vice President; Emmett S. Newman, Secretary; Walter Truesdell, Treasurer; Harold Hine, Editor of "Prop Wash."

COMING EVENTS

On April 17th the Metropolitan Detroit Schools will hold their annual Indoor Model Airplane Contest at the Cass Technical High School Auditorium from 1 to 5 p.m. The events will include:

1. R. O. G.
2. Indoor Fuselage
3. Indoor Stick
4. Indoor Glider
5. Balloon Bursting

Prizes will be awarded winners in each event. Full information is given in Appendix A, which may be obtained by writing Industrial Arts Teacher, Cass Technical High School, Detroit, Mich., or Mr. Fred Schelter, 10815 Worden, Detroit.

NOTICES

Stanley Davies of 331 Alexander, Memphis, Tenn., would like to know if anyone has any copies of Frank Zaic's Model Aeronautics Yearbook. If so, will they write him?

Howard Hall, 19609 Hickory, Detroit, has lost his Sailplane, covered with yellow Silkspan trimmed in black, AMA license 8113. It is powered with an Ohlsson "60" Custom engine, number 5617. If anyone has found this model or has news of it, please write to Mr. Hall.

Two planes were lost at Cleveland last October. One, a red fuselage and yellow winged Zipper with a home-made engine in it. This belonged to Raymond Zucker, 414 Collenwood Blvd., Fremont, Ohio. The other, a blue and yellow Zombie with an Ohlsson 23, number 16667. When they were last seen they were several miles south of Cleveland in the clouds, going south at a great rate. If anyone has news of them please write Merl Shammo, 1120 Hamlin St., Fremont. A reward of $5 each will be paid if they are returned.

A red and yellow Zipper was lost on October 25 from Modelhaven in Baltimore, Md. License number was AMA 15053. Another ship, powered with a Torpedo engine, serial number S572, was lost at a later contest from the same airport. Anyone having information concerning these ships should call Clifton 1564 or write Al A. Armellini, 3812 Woodlea Ave., Balto.

English boys are still "model-wise" in spite of the war; in fact they are probably more so than before the war, but you hear less about it. One of these is Donald Clinch, 4 St. Pauls Place, Halliwell, Bolton, Lancashire, England, who wishes a pen-pal in the United States. He is 15 years old and an Air Training Corps cadet. He will be glad to supply helpful ideas and British model information to anyone who will correspond with him.

Gill Robb Wilson, President of the National Aeronautic Association, recently cited the "box score" of war plane losses to refute critics of American fighting aircraft. Speaking before the regular quarterly meeting of the Association's Board of Directors in Washington, Mr. Wilson said that he was "fed up" with published statements that our ships are bad or dangerous. He added that "If this were so, I would be the first to blast our industry, for I have but one obligation, and that is to the American people." Mr. Wilson lauded the performance of American built and American manned air fighters in recent engagements in many parts of the world, and urged the American people to study the "box score" figures of these engagements. "That's where the bets are paid off," Mr. Wilson stressed. "What do I care what bat Joe DiMaggio uses so long as he smacks the ball over the fence? What do I care how sharp a Zero airplane can turn if the P-40 knocks it out of the sky? No aircraft has every element of superiority.

Here are some comments from California on the new rules; apparently these rules have not gone so well out there. Model Airplane News will welcome any comments, one way or the other, from modelers.

Russell Basye of Oakland, Cal., writes: "I am not in favor of the 1941 A.M.A. rules. I think dethermalizers should be compulsory because of the danger to aircraft observers and also because of the danger of losing the model.

"I like the 10-minute rule because not many gas models will fly 10 minutes three times and there is little chance of there being a tie at a contest."

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SE Keeps 'Em Flying

(Continued from page 7)

in flight jamming the controls, instruments are checked for broken cover glasses and correct readings, clock is wound and set, altimeter is set either for the station altitude or as required by the pilot (some prefer sea-level readings, others the height of the highest point across which he is likely to pass), controls are checked for free and full range of movement and trim tabs set as required by the pilot, oxygen masks are checked and oxygen bottles filled, guns are loaded and thoroughly checked for signs of failure, entire surface of the airplane is thoroughly checked for cracks, breaks or evidence of corrosion, emergency equipment such as exits, fire extinguishers, life raft (if installed), Very pistol and flares, emergency hydraulic pump and emergency brake system, etc., are carefully inspected. The engine is then started and warmed up and the instrument readings are checked to indicate any malfunctioning such as low fuel or oil pressure, lack of hydraulic pressure, adequate electrical system ammeter readings, etc. The engine is opened to full throttle and the engine cylinder head and oil temperatures are checked. Engine speed (r.p.m.) is watched carefully to see that full power is available, the guns may be fired in a brief burst to test for satisfactory operation, the propeller pitch control is moved through its range and the airplane may be taxied briefly to check the brakes for full and free operation. The engine is then stopped and the report filled out. Anything malfunctioning is carefully recorded such as a low oil pressure, an exceptionally high engine head temperature or an aileron control with evidence of "play." If the fault is not of sufficient gravity to warrant the airplane being grounded, it is signed out by the S.E. If the nature is such that it might affect safety of flight, the ship may be put on the temporary inactive list. Should the Squadron Commander need the airplane quite badly that day, the battle starts and normally the S.E.'s word will govern whether or not the airplane flies. In emergencies, the C.O. may accept full responsibility for the airplane's flight and he gives the S.E. an order, in writing, certifying to that effect. This clears the S.E. of any responsibility should subsequent mishaps occur.

Certainly such a complete inspection should suffice for that day but not at all! The next inspection is the "Daily"—given each airplane each flying day. Normally this inspection is made following the first flight of the day and pity the poor S.E. who finds half-a-dozen of his planes badly shot up, parts of them totally destroyed, generators, landing gear motors, flap position indicators, rudder trim tabs or cannon power feed mechanisms shot full of holes!

Here the Supply Officer enters the picture for he must fill the S.E.'s requisition for spare parts and if a particular item is not on hand sizzling, censored demands are made: "Well when can I get it?", "Can you wire the Depot?", "What time will the next transport be in?", etc. In the case of damaged structure the Repair Officer accepts the airplane and his crew begins removing the damaged portions, re-fabricating new ribs, stringers and skin from materials on hand. When the required extrusion or bulkhead is not on hand and cannot be supplied from spare parts stock ingenuity comes into play and the parts are formed from raw stock. In a combat zone the planes must be re-built and outfitted as rapidly as possible and stories have been told of one type ship actually taking the air with a complete outer wing panel from another entirely different type of airplane! Such cases are quite rare, fortunately, but badly damaged airplanes are usually set aside in a salvage pool and parts needed for serviceable airplanes of the same type taken from it as required.

In each theater of operations there is an Air Forces General Depot, normally far removed from the combat zone, which serves as a vast stockroom for spare parts and the thousand-and-one items necessary to keep an Air Force flying. This stockroom is not concentrated in one huge depot (too easy for the enemy to get in a telling blow) but is decentralized into several Service Centers which are, also, far enough behind the lines to prevent sudden attack by enemy ground troops, but with four hours motor transport to the combat unit. A combat squadron usually keeps supplies for several days at its temporary base, a somewhat longer period at a permanent base, a Service Group maintains still longer supplies and an Air Depot keeps supplies for as long as several months. A service group normally supplies 8 combat squadrons, and an Air Depot supplies from two to six service centers, so that 20% of the total number of airplanes in service with the 48 squadrons in the vicinity (frequently 1200 planes) in equivalent spare parts must be constantly on hand ready for delivery! (See MODEL AIRPLANE NEWS, July 1942 issue for details of the Air Transport Command.)

At the nerve center of these many elements is the Squadron Engineer who keeps a flow of supplies arriving at his unit, working fast on installations, constantly devising better and faster methods of servicing. Countless numbers of quick-service devices have been ingeniously worked out by Service Engineers such as complete hydraulic test stands, complete electrical switch panels, special wing-jacks and hoist mechanisms, and hundreds of special tools like wrenches for reaching

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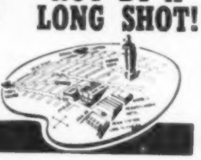

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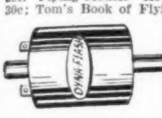

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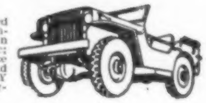

The war "limousine" used by The President at Casablanca! Scale model kits in heavyweight pulpboard 29c; Wood kits 50c; Giant size $1.25. Detailed plans and turned wheels in each! (BY MAIL, add 15c for packing-postage.)

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50" span glider with spiral control for towline launching. Releases automatically at peak of launch.

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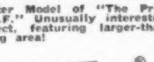

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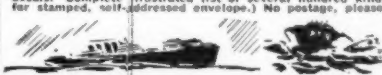

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GRUMMAN SKYROCKET

formerly inaccessible bolts and nuts. After the war these devices will become available to the airlines and the private plane owner for simplifying his service and maintenance problems.

The next inspection period is "10-Hours," normally once-a-week on an average. This includes all of the items in the "Pre-Flight" and the "Daily" plus a more complete "going-over." All inspection and access doors and panels are removed and the plane's interior with its thousands of parts and mechanisms are carefully inspected. Control cables are checked and tightened, safety of all bolts is ascertained, evidences of structural failure such as at the engine mount or in the main spar or longeron fittings are checked for, wiring is replaced if necessary, and all items of the hydraulic system are carefully checked including selector valves and fitting, check valves, actuating units, etc.

The "20-Hour" inspection comes next at which time the airplane is completely dismantled (with the exception of major items) and every item mentioned in the previous inspections plus many more are here performed. Control surfaces are removed, wheels taken apart and brakes checked, propeller is removed and inspected, erratic mechanisms such as hydraulic actuating cylinders, electric gear motors, fuel lines and pitot-static system fittings are carefully inspected.

The "50-Hour" is the first really major inspection of the airplane and at this period it is totally and completely disassembled and everything completely checked. Mechanisms are dismantled and tolerances and clearances checked, worn bushings, sleeves and bearings are replaced and the entire airplane and all its parts are thoroughly cleaned with live-steam and naptha or other organic solvents. The engine is removed and for this purpose completely demountable power-plants have been devised. These consist of the engine mount and all accessories such as starter, generator, fuel, oil, hydraulic, vacuum pumps, air-oil separator, oil filter, primer solonoid, gun-interrupter solonoid, tachometer shafting, temperature, fuel and oil pressure, manifold pressure and other gages all of which are mounted on the engine or engine mount and all are removed from the plane by simply making the required disconnections at the firewall and removing engine mount-attaching bolts. Either a serviceable and thoroughly checked powerplant is rebolted in place or the original serviced.

These inspections are not necessarily made at the exact time interval mentioned, or all at one time. For instance the "20-Hour" inspection is made between the 15th and 25th hours of flight time on the airplane and several days may be consumed in the inspection during which the airplane is in service for a part of each day. As each item is inspected it is noted in the inspection form usually mounted on the wall of the hanger. In this manner airplanes are not kept out of service for the full 24 to 36 hours required for such an inspection.

The "100-Hour" inspection may be termed a top overhaul and is usually accomplished at the Air Force Depot or at a Service Center and the plane is normally removed from active service for this job. As it passes its 90th hour in the air it becomes due for this inspection and sometime within the next 20 hours is removed from the squadron at the order of the S.E. and delivered to the Depot for the job. This inspection includes all work previously mentioned plus removal and replacement of a large number of units which must be sent back to a major depot for complete overhaul or even back to the manwfacturer. Such items as instruments, starters, generators, all types of pumps, hydraulic struts and actuating units, electric motors and gear-drives, all armament items and controls, and a variety of special equipment items which will have normally served their useful life by this time. Although 100 hours of service may seem a short time, in the life of an airplane in terms of actual flight time, it is a great deal and, unfortunately, few of our warplanes ever reach this inspection. Normal flight time is taken as 2 hours each flying day or 8 hours per week. This would mean, in the course of an average military airplane, that the plane would have been in service constantly for three full months. And records have shown that the actual life of a military airplane is not very long in actual combat. For this reason, few ever reach the "100-Hour" inspection.

It is the Squadron Engineer's job to see that these inspections are made at the proper time in the proper manner and that an airplane due for an inspection does not run too far over the prescribed time irrespective of the pleadings of a squadron commander. The S. E. must see that trained and skilled mechanics are available, that they are thoroughly familiar with the airplane to which they have been assigned and that the specialists in his command (i.e. radiomen, electricians, engine mechanics, armament mechanics, etc.) are constantly available and have the required tools and equipment with which to do their work.

Engines in the Air Force are normally overhauled at around 300-350 hours as compared with the 6-800 hours of the modern commercial airline. Foreign airlines in peacetime often overhaul only once every 1,000 hours! This frequent, comparatively, overhaul has contributed to a large extent to the famed reputation of American aircraft engines for, irrespective of their inherent reliability as a tribute to their designers and manufacturers, the great care and precision servicing given them by our airlines and most particularly the Army Air Forces, has kept them in first-class condition for many hundreds of hours beyond that of a badly abused but otherwise reliable engine.

Emergencies are the the test of the Squadron Engineer and he must improvise, be prepared to do practically any job connected with aircraft in wartime. He has a trained salvage crew under his direction who are frequently called to bring in an airplane miles from a base in a dense jungle, a marshland or a dry, arid desert. These men, in their special traveling repair shops, must be equipped to

disassemble the airplane, mount it on the truck and bring it back to the base. Not infrequently it is necessary to repair on the spot so the airplane can be flown out. A Flying Fortress, downed in a jungle in the Solomons, was completely repaired, a runway cleared, metal-strips flown in and laid down and the plane flown off. This case is not uncommon and another tribute to the Squadron Engineer and his salvage crew.

The S. E. performs his job almost casually—but efficiently, almost mechanically at bases within the United States at which *everything* for his convenience is instantaneously available. But out at Henderson Field on Guadalcanal, or at Sidi El Miri in Tunisia, or Ber Matal in India, where his "squadron" may be 6 Curtiss P-40's, or only 2 Flying Fortresses, his mechanics consist of just 4 men and his "depot" 2 spare tires, a set of spark plug wrenches and a handful of standard bolts and nuts, where every day finds more Jap or Nazi bullet holes in his airplanes and more equipment smashed. . . . It is then that the S. E. exercises that rare bit of genius which somehow, fate willing, keeps those crates in the air, keeps 'em fighting the enemy, and keeps the squadron C.O. posting victories. And the Squadron Engineer seems to be as always, the miracle worker behind the scenes, the ever-present, ever-devising, ever-successful magician buried deep in a weather-rotted tent-hanger, tinkering, swearing and perspiring, doing the world's toughest job—to "Keep 'em Flying."

VICTORY

Building Your Own Wind Tunnel

(Continued from page 17)

same manner as section AB. All stringers are parallel, and bulkheads at both ends are identical. This section of the tunnel must be elevated on a 7" stand in order that bulkheads BB' and CC' will coincide. Cover the inside of the stringers that form the section with the same type cardboard used in section AB. Bear in mind that the tunnel's inner surface must be absolutely smooth; it is advisable to apply a good grade of wax to the inner surface when completed.

Because of the fact that when wind leaves the fan it is in a turbulent state, a honeycomb is absolutely necessary to permit the test-section acting in a manner similar to that encountered under ordinary flight conditions. The purpose, then, of the honeycomb is to change the turbulent air, coming from the fan, to a perfectly streamline flow. The honeycomb is one of the most important parts of the entire tunnel. The most economical and neatest job can be obtained by using the "giant size" soda straws. We recommend that in doing this, you cut the straws into 3" lengths and glue them together, stacked side by side, as shown on plate A. The honeycomb is located in section CD, near the throat of the

—WIN *with Berkeley!*

"AIR-TEX" DIE-CUT PARTS MAKE THESE GREAT KITS 'WAY GREATER

NEW —THIS AMAZING SUPER-SINBAD

62" Wingspan

$2.50 Post-paid

The new Super-Sinbad is the ultimate in glider design. With the new "Tow-Control," a superior high performance wing design, and rugged construction throughout, it is a model that will see hours and hours of flying . . . a model that only Berkeley can produce at this remarkable low price. The kit has complete die cut "Air-Tex" parts, cement, wood veneer and silkspan covering, and parts for tow control.

TOW-LINE LAUNCH WITH NEW "TOW-CONTROL"

Tow-line launch with new "Tow-Control." Never before has this amazingly simple and effective method of flying a tow line launched glider been used. With "Tow-Control" it is possible for you, without any assistance, to steer the model to any part of the field you desire and then to release the model for long soaring flights in whatever direction you desire.

BUCCANEER "B" SPECIAL

54" Wingspan

FEATURING STALL-PROOF, SLOTTED WING, AND SPIN-ARRESTING TAIL

More Buccaneers have been built and flown than any other gas model and this Buccaneer is the most popular of all Buccaneers. The Buccaneer "B" Special gives you the ultimate in safe, stable, super-performance. No more whip-stall or spins due to improper adjustments with the Buccaneer "B" Special, the only gas model with spin arresting tail. Power it with a small class "C" or any class "B" engines. Kit includes die cut "Air-Tex" parts, finished propeller, rubber wheels, form landing gear, cement, etc.

$3.95 P. P.

REPUBLIC THUNDERBOLT P-47B

¾" Scale—31" Wingspan

The first authentic model of America's newest fighter. Complete kit with "Adjust-O-Pitch" propeller, "Air-Tex" die cut parts, phantom drawings, insignia, cement, etc. .... **$1.00 P. P.**

CURTISS P-40 War Hawk

¾" Scale—28" Wingspan

Complete drawings show you how to make all the models of the Curtiss P-40 from the XP-40 through the P-40-F. The kit is complete with "Adjust-O-Pitch" propeller, "Air-Tex" die cut parts, insignia, cement, etc. .... **$1.00 P. P.**

BELL AIRACOBRA P-39

¾" Scale—27½" Wingspan

One of the finest flying scale models ever designed. Its performance as a flyer amazes the experts. Complete kit with die cut "Air-Tex" parts, "Adjust-O-Pitch" propeller, insignia, cement, etc. .... **$1.00 P. P.**

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tunnel.

When the wind tunnel is ready to be assembled section AB and CD can be bolted together at bulkheads BB' and CC'.

Necessary instruments are a lift scale, drag scale, pitot-static tube and manometer, thermometer and barometer. The barometer will be your only major expense, however an inexpensive aneroid barometer will give desired accuracy for use in this tunnel.

Lift and drag scales are made of bar-aluminum (24 ST). All necessary dimensions and details are shown on plate B. The knife edges should be made of hard steel to eliminate as much friction as possible. Place the scales on the instrument support and bolt the support to the top of section CD, as shown on plate C.

Test-sections should be cut from hardwood and mounted as shown on plate C. Use an aspect ratio of approximately 6 on all airfoils tested.

The pitot and static tubes are made of 1/4" brass stubing. The pitot tube is open at the front; the static tube is closed at the front, with four small static holes along the side of the tube as shown on plate C. The tubes are connected with rubber tubing to their respective manometer arms. (See plate C.) The micro-manometer shown on plate C was designed to give greater accuracy in determining the wind velocity. It consists of an inclined glass tube connected to the reservoir by rubber tubing. (Plate C.) The angle of inclination of this tube should be approximately 0° 15' 00".

OPERATION: The test-section is suspended on the lift scale so that it hangs in the center of the tunnel throat. Balance the test-section by means of the rider so that the pointer reads zero, as shown by the picture. Now allow the wind to flow about the test-section; under these conditions, it will have a definite lift. Lift may be determined by the weight required in the balance pan to bring the pointer back to its initial reading of zero. The fan must be stopped and the wing must be rebalanced for each change in the angle of attack. If water is used as a gauging liquid in the manometer, the coefficient of lift will be:

$$C_L = \frac{L}{(2350)\ (\sin\theta + d^2/D^2)\ (y)\ (S)}$$

where (L) is lift in grams weight; (θ) is angle the inclined tube on the manometer makes with the horizontal; (d) is diameter of the inclined tube of the manometer in inches; (D) is diameter of the reservoir of the manometer in inches; (y) is distance the water travels along the inclined tube of the manometer in inches, and (S) is the area of the test-section in square feet. These symbols will refer to the same quantities throughout the entire article.

The principle of the drag scale is the same as the lift instrument. The test-section is suspended on the drag scale in the center of the tunnel throat. It is balanced by means of the rider, so the pointer reads zero when no wind is passing through the tunnel. The excess weight in the balance pan, necessary to bring the pointer back to its initial reading of zero when the wind is flowing about the test-section, is a factor of the drag. Correction for the true drag, due to construction of the instruments is expressed as follows from the principle of moments.

For positive angles of attack, the true drag is

$$D_t = \frac{(7.75\ (D_s) + (M)\ (L_a)\ (\sin a)}{(M)\ (\cos a) + 5.5}$$

For negative angles of attack, the true drag is

$$D_t = \frac{(7.75)\ (D_a) - (M)\ (L_a)\ (\sin a)}{(M)\ (\cos a) + 5.5}$$

where (D_t) will be expressed in grams weight if (D_a) is the excess weight in the balance pan in grams weight; (M) is distance from point of support to aerodynamic center of the wing in inches; (a) is angle at which the test-section is set on the drag scale; (L_a) is lift in grams weight of the test-section at the angle at which the test-section is set on the drag scale. Note that the constants 7.75 and 5.5 are distances from the knife edge to the balance pan, and the knife edge to the point of support respectively. Through this calculation, we obtain the true drag (D_t) of the test-section. From these values of the true drag, determine the coefficient of drag by the formula

$$C_{D_t} = \frac{D_t}{(2350)\ (\sin\theta + d^2/D^2)\ (y)\ (S)}$$

where (D_t) is true drag in grams weight. Note that this formula holds only if water is used as a gauging liquid in the manometer. Making the correction for effective aspect ratio, we now determine the profile drag coefficient by the formula

$$C_{D_o} = C_{D_t} - \frac{C_L^2\ (S)\ \left[1 - \frac{1}{2}\,(b/t)^2\right]}{b^2}\ (1 + \sigma)$$

where (S) is area of the test-section in square inches; (b) is span of the test-section in inches; (σ) is Induced drag Correction (see the graph on plate C), and (t) is diameter of the tunnel throat in inches. The coefficient of induced drag can now be calculated by the formula

$$C_{D_i} = \frac{C_L^2\ (S)}{\pi\ b^2}(1 + \sigma)$$

The sum of the Profile Drag Coefficient (C_{D_o}) and the Coefficient of Induced Drag (C_{D_i}) will give the Absolute Coefficient of Drag (C_D) ($C_{D_o} + C_{D_i} = C_D$), which is the value most often seen on graphs. The conventional thing to do is plot the curve of the Coefficient of Lift and the Coefficient of Drag (Absolute) on one graph, with the C_L and the C_D as ordinates, and the angles of attack as the abscissas. Since the numerical values of the C_L and the C_D are so very different in magnitude, the relative scales of the two

should be varied accordingly. Very often the ratio of lift to drag (L/D) is also plotted on the same graph with due regard given to its scale. The maximum point on this curve represents angle of attack at which the wing is most efficient.

If for any reason you wish to determine the wind velocity, it can be calculated by the formula

$$V = 80\sqrt{\frac{(\sin\theta + d^2/D^2)\,(y)\,(T + 460)}{P}}$$

The velocity will be expressed in feet per second, if (T) is temperature in degrees Fahrenheit, and (P) is atmospheric pressure in mm. of mercury. Remember, this formula holds only if water is used as a gauging liquid in the manometer.

In order to benefit greatly by this wind tunnel, we suggest you check on the derivations of the formulas contained in this article. In doing so you will familiarize yourself with many aeronautical terms, and acquire a scientific viewpoint on your model building. The material cost of this wind tunnel, excluding motor and barometer (the latter of which is necessary only if you wish to determine the wind velocity), should be well under $4.00. We did it for $2.70. At this price this wind tunnel is one thing no builder can afford to be without.

May we wish you luck in your first attempt at true experimentation in this fast-growing hobby. Don't expect to discover anything that will revolutionize the aeronautical industry, but keep in mind that everything you observe will bring you closer to a successful aeronautical career.

Derivations of Equations

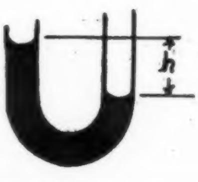
VELOCITY EQUATION

Bernoulli's Theorem states that

$$P_s - P_o = \tfrac{1}{2}\rho V^2$$

where (P_s) is static pressure, (P_o) is pitot pressure, (ρ) is density of the air, and (V) is velocity.

The difference in pressure ($P_s - P_o$) is determined by a manometer by the expression



dgh = difference in pressure.

where (d) is density of the gauging liquid, (g) is acceleration due to gravity, and (h) is manometer head. From this, we obtain

$$V = \sqrt{\frac{2dgh}{\rho}}$$

For simplicity in determining velocity, let us get an expression for the density of the air.

We know that

$$PV = RT$$

where (R) is universal gas constant for air.

But,

Volume = Mass/Density

Using unit mass, we get

$$(P)\ (1/\rho) = (R)\ (T)$$

$$\rho = P/RT$$

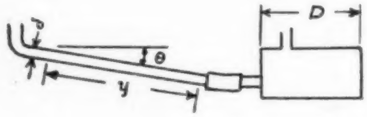
Substituting, we get

$$V = \sqrt{\frac{2dghRT}{P}}$$

Since we are going to use water as a gauging liquid, we can remove all the constants. From this we get

$$V = \sqrt{\frac{hT}{P}}$$

We are going to use a micro manometer to determine the above (h), so the equation now becomes



$$h = (\sin \theta + d^2/D^2)\ (y)$$

$$V = 80 \sqrt{\frac{(\sin \theta + d^2/D^2)\ (y)\ (T)}{P}}$$

V = in ft./sec.
y = inches
T = degrees Absolute
P = mm. of Hg.

$$L = C_L\ qS$$

L = lift in lbs.
C_L = Coefficient of Lift (Absolute)
q = Dynamic impact.
S = Area in square feet.

$$C_L = \frac{L}{qS}$$

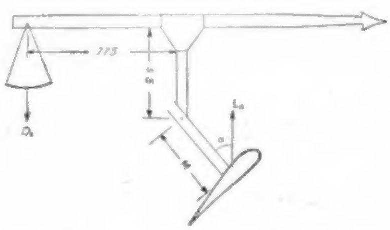
Substituting a value for (q), and converting into convenient units, we get

$$C_L = \frac{L}{(2350)\ (\sin \theta + d^2/D^2)\ (y)\ (S)}$$

L = grams weight
y = inches
S = Area in square feet.

Similarly for the Coefficient of Drag.

TRUE DRAG CORRECTION



$$D_t\ (M)\ (\cos a) + (5.5) = 7.75 D_a + (M)\ (\sin a)\ (L_a)$$

$$D_t = \frac{(7.75)\ (D_a) + (M)\ (L_a)\ (\sin a)}{(M)\ (\cos a) + 5.5}$$

Similarly for negative angles of attack.

VICTORY

Air Youth

(Continued from page 29)

gas and tire rationing and shortages of rubber and gasoline for the flying of models, the number of model contests throughout the country has dropped to a minimum. Many clubs have expressed the view they wish to do nothing to hamper America's all-out war effort by holding large meets necessitating use of transportation facilities.

The Academy agrees that precious tires and A-cards should be treated with due respect, but reminds modelers that aeromodeling is now paying big dividends for the defense of the Americas through pretraining of hundreds of thousands of boys and girls in aviation and handicraft. Youth training in aviation through building and flying of model aircraft is fundamental to air-supremacy either for war or peace. The Axis Nations built their air power through mass movements which carried the young people step by step into their jobs on the firing and assembly lines. America has done as much through volunteer action by more than two million aeromodelers throughout the country.

Flying of model planes in competitions can be accomplished without using overtaxed transportation facilities through emphasis on local meets and inter-club competitions. Challenge the club in the same locality as yours, and if there is none, plan a series of contests in your own club. Solicit new members and build up tough competition. Write to headquarters and obtain a supply of "Application for Sanction" forms. If you have trouble obtaining trophies and prizes make application for Berkeley War Bond Awards and those beautiful Air Youth medals available for AMA sanctioned affairs. Get your meets organized and "Start 'Em Flying!"

Believe It or Not . . .

Robert Ripley, of radio and newspaper "believe-it-or-not" renown, recently announced his donation of full radio time and talent to the Air Youth Movement sponsored by N.A.A. This announcement was made in the offices of Vice President Henry A. Wallace at the time of the annual Collier Trophy Award.

Beginning with the Jan. 1 program of "Scramble" over the Blue Network, Bob Ripley will act as Master of Ceremonies in the aeronautical dramatizations, at the same time taking active part in preparing the various "unbelievable" episodes. Of the latter he has a wealth of material which does not lend itself to cartoonical treatment. Along with giving his time and efforts to the radio phase of the Air Youth Movement, Believe-It-Or-Not Bob will embark on a nationwide speaking tour in the interests of Air Education.

In a statement made before Vice President Wallace, Mr. Ripley said he has long been an aviation enthusiast, yet here of late he has come to recognize the vast amount of territory still to be covered in adequately presenting the truth about Flying to the people. And, he added, there is no better

GRUMMAN F3F1
U. S. NAVY SHIPBOARD FIGHTER

32" Span. Length 24". 1" Scale

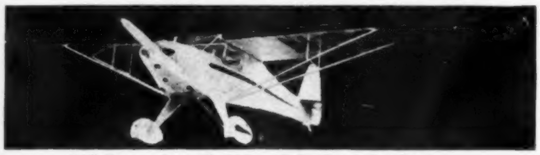
A fine detailed model with retractable landing gear, 4" turned balsa motor front, 3 oz. grey dope, ½ oz. yellow, 2 oz. glue etc., all parts printed on balsa, 10" propeller, wheels, rubber motor, full size drawing, and all parts. This fighter plane is wheels, full size drawing, and all parts. This fighter plane is used in large numbers on the aircraft carriers. Const. Set complete, postpaid. **$3.75**

SEVERSKY P35A ARMY PURSUIT

32" Span. Length 25". 1" Scale. Color, Silver

Set has 4" turned balsa motor front, 10" carved prop, balsa wheels, tail wheel, rubber, all parts printed on balsa, 3 oz. silver dope, ½ oz. black, 2 oz. glue, etc., insignia, and full size scale drawing. New improved model has retractable landing gear and movable controls from cockpit. Set, postpaid.......... **$3.25**

TAYLORCRAFT SPORTPLANE



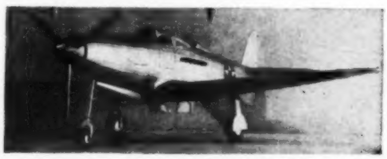
36" Span. Length 22". 1" Scale. Weight 2 oz.

A beautiful exact scale flying model with unusual flying range, so light it will rise from land in 6 feet. Const. set contains all parts printed on balsa, carved propeller, hardwood wheels, 2 oz. white dope, ½ oz. black, glue, full sized scale drawing, and all parts to build. Set, postpaid.......... **$1.50**

NEW BELL P39 AIRACOBRA U. S. ARMY FIGHTER

34" Span. Length 29". 1" Scale

The best detailed P39 on the market. Model has retractable gear, paints, and all parts. Construction set, postpaid.......... **$3.50**



All illustrations shown here are actual photos of our finished models. Due to the defense requirements, it may be necessary to furnish harder wood than balsa for some of the parts. We ask your co-operation.

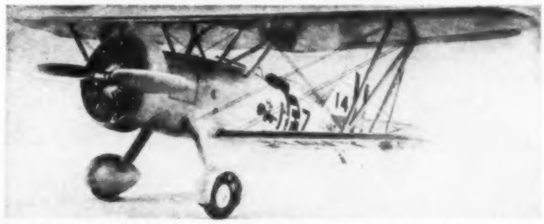
BOEING B-17 FLYING FORTRESS BOMBER

44" Span. Length 30". Color Silver. Weight 6 oz.

THE MOST SENSATIONAL EXCLUSIVE BOMBER SET IN THE WORLD

Set has all parts printed on balsa, four 2" special finished motor fronts, four 4" carved props, celluloid wheels, set of paints, glue, and full size drawing. Set, postpaid **$4.50**

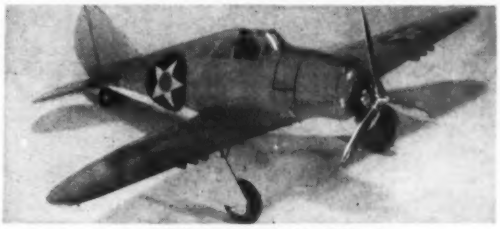
CURTISS HAWK F11C4 PURSUIT NAVY



32½" Span. Length 22¾". 1" Scale. Weight 6 oz. Color grey, top wing yellow

THE MOST EXCLUSIVE AND FINEST EQUIPPED MODEL IN THE WORLD. MOVEABLE CONTROLS WORK FROM COCKPIT. A special de luxe model, one of the most beautiful ever made. Set contains a 4½" scale Wright Cyclone celluloid motor, detailed push rods, fins, etc., like real motor, 4½" aluminum cowl, 10" steel type carved prop shown, 2⅛" wheels, tail wheel, star and rudder insignia and lettering, windshield, instrument board, flying wires, 4 aluminum step plates, aluminum wing walks, ready cut wheel pants, washers, 3 oz. grey paint, ½ oz. yellow, ½ oz. red, 2 oz. glue, etc. All other parts are printed on balsa wood 33"x44" scale drawing. Const. set, complete in labeled box, postpaid.......... **$4.50**

REPUBLIC P43 LANCER SOLID



READY-BUILT MODEL.......... **$15.00**

14" Span. Length 10". ⅜" Scale

Set has completed finished fuselage, headrest attached, cockpit cut out, etc., scale cast motor, cast propeller, wheels, paints, wings, etc., cut to shape, drawing, etc. Set, postpaid.......... **$2.25**

NEW CURTISS P40F WARHAWK SOLID

14" Span. Length 11¾". ⅜" Scale

This and our F11C4 are the finest solid sets in the world. Set has completely finished balsa fuselage, turned spinner, routed out cockpit, paints, glue, insignia, wheels, drawing, etc. Wings, tail and rudder cut to outline. This Masterpiece set, postpaid.......... **$2.50**

Ready-Built Model $17.00

NEW CATALOG

Large 6" photos of latest models, gas models, motors, etc.
New Catalog No. 8
Send 10c coin

ORDERING INSTRUCTIONS

Orders sent west of Mississippi, add 15c postage—Foreign, 20c.

BOEING F4B4 NAVY FIGHTER

22½" Span. Length 14½". ¾" Scale

Set has 3" celluloid motor, 3¼" tapered aluminum cowl ring, set of paints, all parts printed on balsa, drawing, etc. Set, postpaid.......... **$2.95**

CURTISS F11C4 SOLID MODEL

10½" Span. Length 7½"

Set has completely finished balsa fuselage, cockpit cut out, wings cut to shape, 1½" deluxe cast motor, alum. cowl, 3 bladed cast prop, paints, drawing and all parts. Set p.p.......... **$1.75**

MINIATURE AIRCRAFT CORP.
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way of building for the future than to give the plain, unvarnished facts to the youngsters of the land. "We have a classic example, believe it or not," Mr. Ripley concluded, "'in how far the education of youth can extend in the case of one Adolf Schickelgruber."

Youth's Cap Formed to Aid War

A Civil Air Patrol Cadet Force of young people has been formed in all states and is working under already-active senior home guard air patrol units.

Native-born high school age boys and girls will compose the CAP cadets and will be assigned to members of the senior division to receive flight instruction in advance of that taught in senior high school classes. On graduation from high school the Cadets will be eligible for full membership in the CAP. Eighteen will be the minimum age for flying assignments.

The senior Civil Air Patrol acts both as an aerial home guard and as a reservoir for recruiting and training of civilian volunteers to be assigned to active duty; great numbers of airmen have gone from the patrol into the armed forces.

Application for membership forms, No. 637, may be obtained from the Civil Air Patrol, Office of Civilian Defense, Washington, D.C.

High School Aviation Trainees Top Safety Record of Collegians

The CAA, in a report on test aviation courses given in 22 high schools, said high school boys required an average of 38 hours flying time, to complete the elementary course—exactly the same time averaged by 68,000 college trainees—and scored an average flight grade of 77 percent compared with 79 percent for the collegians. In safety, high school boys did better than the college students—174,000 miles flown per accident against 141,000 in the college phase. None of the three accidents in the high school program involved a trainee fatality.

Bruce Uthus Outlines Program for Air Youth

Recently Mr. William P. Redding, NAA Vice President, inquired from CAA as to what course, in the opinion of that department, shall be undertaken in our Air Youth work. A letter was received from Bruce Uthus, technical assistant to the Administrator, parts of which are quoted below:

" . . . Since the major aviation development in schools at present is establishment of pre-flight aeronautics courses, there is a need for a complementary extra-curricular program.

" . . . For students who are not yet old enough or sufficiently advanced in the grades to enroll in pre-flight aeronautics courses, a more elementary applied aeronautics program is desirable.

" . . . In view of these new developments, (recognition of the interest of youth in aviation and introduction of pre-flight aeronautics) the NAA through its representatives and club leaders can increase its effectiveness in the assistance it renders to youth and bringing the field of model building and flying to the attention of local school officials and teachers. Through the medium of schools new leaders can be developed, new model airplane clubs can be formed and existing clubs enlarged, thus serving as an extra-curricular education device . . .

"In addition to this activity, the NAA might well continue the splendid work it has started in development of model building instructional material graded from paper models to the advanced power model levels . . .

" . . . Much of the most effective leadership for extra-curricular activities will be found in school teachers . . . However, few teachers are sufficiently experienced to conduct applied aeronautics activities. Members of your Academy of Model Aeronautics might well offer to serve as consultants to teachers who are leaders of such club activities.

"It is our suggestion that you consider a program of the type outlined above in your very commendable efforts to increase knowledge and appreciation of aviation knowledge among American youth. Such a program would not conflict but would supplement the aviation training taking place in the school curricula."

Ed. Note: Many of the steps outlined in the above letter have already been undertaken. Leader Members of the AMA have been asked by headquarters to contact their local schools and offer their services wherever needed in instructing teachers and students in model building and flying. The response to this request has been most gratifying and it is expected that much progress will be made during the ensuing school term through such efforts of Academy Leaders.

Academy Issuing Control Licenses

The AMA is now issuing control model licenses to both licensed and non-licensed model fliers. Control licenses are free to those now holding AMA licenses ($1 includes gas model license and control model license). Both licenses will be set up to expire on the same date. Only requirements are that you make application on the official form and enclose 10c in stamps to cover postage and handling fees. The official application form is available from AMA headquarters, 1025 Connecticut Ave. N.W., Washington, D.C.

JAR Flights 65 & 66 Active in Long Island

Among the first to become interested in the Junior Air Reserve program was Mrs. J. BesBriere Irwin of Locust Valley, New York. Mrs. Irwin has long been interested in aviation and has held a private pilot's license since shortly after World War I. Being equally interested in young people, she was quick to recognize the benefits of the Junior Air Reserve program and formed JAR Flight 65 for boys which was closely followed by formation of JAR Flight 66 for girls, thus becoming the first JAR Squadron Leader in New York State.

Assistance in sponsoring the program was obtained from the AWVS in Locust Valley of which Mr. Irwin is an active member, having completed the volunteer's course in motor mechanics. Mr. Ernest Keller is acting as instructor for the Flights and the excellent quality of workmanship reflected in the models made by these groups is a high tribute to his ability to teach the art of areomodeling. Already every member of both Flights has satisfactorily completed an all-wood glider and is industriously working on his second model.

Mrs. Irwin has outlined a most interesting program for her group and regular meetings are held in her home where facilities are provided for study and modelmaking. Among other subjects lectures on the fundamentals of meteorolgy have been given and nearly all members obtained a high grade in an examination on this subject. Mrs. Irwin hastens to explain that although both the boy and girl Flights meet at her home, she is very careful to comply with JAR Rules and Regulations in this respect, holding meetings for the boys and girls at separate times. A great deal of credit goes to the planning and administration of the Junior Air Reserve program accomplished by Mrs. Irwin and her associates. Air Youth headquarters feels this group is an example which may be emulated by others throughout the country.

Ground Courses for AMA Clubs

The value of study courses conducted by AMA chapters and affiliated clubs cannot be over-estimated, especially during winter months when flying is reduced to a minimum, and model fliers' interest threatens to wane. Such courses give the model builder a broad knowledge of the whole science of flying and are of real benefit to him in his work. Inasmuch as the ultimate goal of many model enthusiasts is the flying of full-scale machines, their interest should be stimulated by teaching subjects required of pilots.

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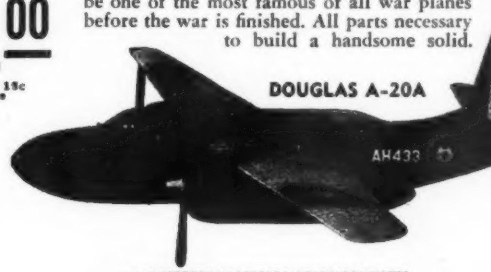
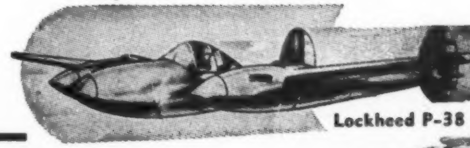


HITLER—HERE THEY COME

DOUGLAS A-20A. Originally called the DB7, and christened the "Havoc" by the British, the A20A is now being piloted by the Americans in nightly patrols across the channel. Modelcraft engineers "picked it" several months ago. Similarly, we were first with a Lockheed "Lightning," probably the best known American interceptor, terrific for speed. Both kits are 1/4" scale solids with authentic plans and complete details. Add 10c postage **Each 60c**



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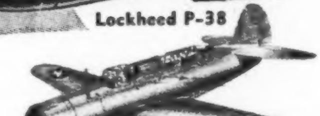

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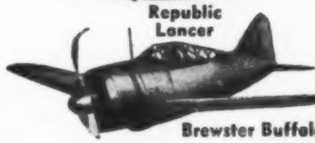

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Each club should work out a program of weekly lessons following usual classroom practice with each boy reciting. Material for these study courses may be obtained from your local library or from AMA headquarters. NAA's Air Youth Division has approved an "Aviation Flight Library," (See list) in a series of 41 pamphlets dealing with the first principles of flight, construction and maintenance, aviation engines, meteorology and aircraft instruments. These pamphlets are popularly priced from 25c to 50c each, and contain a wealth of information for group or individual study. For a detailed listing of the pamphlets, send a three-cent stamp to Air Youth at 1025 Connecticut Ave. N.W., Washington, D.C.

Also available from headquarters are two silhouette charts showing fighting planes of the United Nations and Axis Powers in three-view silhouettes, which sell for 15c each postpaid. The Parts of a Plane nomenclature chart which presents a lightplane and identifies 21 parts costs 10c postpaid.

If your club desires to organize its own study courses, there follows a list of subjects in logical order for a ground course in aviation:

1. History of Aviation
2. Theory of Flight
3. Airplane Structure & Construction
4. Propellers
5. Power Plants
6. Types of Airplanes
7. Airfoils
8. Controls
9. Landing Gear
10. Aerobatics
11. Instruments
12. Navigation
13. Blind Flying
14. Aids to Aerial Navigation
15. Government Supervision—the CAA
16. College Flying
17. Sporting and Private Aviation
18. Aviation Societies & Organizations
19. Gliding and Soaring
20. Military Aviation
21. Use of the Airplane by the Coast Guard

Editor's Note:—It is suggested that a more logical arrangement would be to insert No. 7 between No. 3 and No. 4, and to insert No. 8 and No. 9 between No. 5 and No. 6.

VICTORY

Modeling Your Future in Aviation

(Continued from page 11)

However it is not always possible to design a model so it is both stable and efficient to the greatest degree. In many cases there is often a conflict between these two essential elements, and in such cases a compromise must be reached.

In model planes stability is the most important of the two, for without it no model can demonstrate its efficiency for it will not remain in flight. It is not always necessary to reduce efficiency greatly in order to retain stability however; efficiency should be sacrificed only to the extent that the plane will be stable enough but not too stable.

Inexperienced designers can carry stability to excess in such cases and thereby cut efficiency more than necessary. For example, the stabilizer controls longitudinal stability; if it has an area of 45% of the wing area it will be extremely stable but 33% is usually sufficient to stabilize the plane so that it will recover its balance without difficulty. The objective therefore is to provide only as much stability as required without impairing efficiency.

Stability being the first consideration, proceed by determining how stable the plane should be and proportion your plane accordingly. Then make it as efficient as possible by modifying these proportions wherever possible to give efficiency without eliminating stability.

To thoroughly understand the effect of size, shape and proportions of a plane and be able to design fine fliers, it is necessary to know aerodynamic and design principles governing their flight. This can be determined by designing and building models of various proportions, varying their basic design, and noting the effect of each by a series of systematic experiments.

Such a series of experiments should be initiated by designing and building a simple basic plane proportioned primarily for stability but as efficient as possible to provide experience in flying technique and understanding of fundamental building and design problems. In effect this is a practice plane, to give the builder "the feel" of the air and help him visualize normal flight reactions. This is essential if he is to detect the effect of improper design. Such a plane gives a feeling of what is standard and what is abnormal, a basis for future estimates. After a little practice unnatural flight reactions can be discerned immediately and the model builder can determine whether or not there is, for instance, too little fin area, stabilizer area, where the balance can be improved, etc. So, let us create our basic model and begin experimenting.

A definite procedure should be followed in designing any plane in order to obtain the desired results, so following is an outline of proportions, and procedure to be followed in designing all types.

Span is the basic measure and determines the plane's size, so knowing the purpose, the first step is to determine the size or span. If the plane is too small flight reactions will be erratic; if too large, cost to build will be excessive and repairs when damaged will require considerable time. Obviously when experimenting it is advantageous to make repairs quickly and continue with the tests. This gives a hint to construction which should be simple.

A plane of the all-wood type is always preferable. Average span for a model is about 21", so this value is selected. Next the wing chord is determined. This should be about 1/7 the span, in this case 3". All proportions of our basic model are shown in Fig. 80. The curvature of the wing determines the model's speed and efficiency; obviously high speed is not desirable, for usually more damage results than with slower models. The speed is determined largely by the camber or height of the wing curve; an average value is about 1/12 the chord, in this case 1/4" for single surface wings. ("Single surface" means a


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wing in which the upper and under surfaces are approximately parallel; for instance, a wing made of a single sheet of curved balsa wood.) For double surface wings curved on the upper side and with approximately flat undersurface so that the wing has thickness, the camber should be increased 1/3. So for this latter type the camber will be 1/10 to 1/9 the chord, being slightly over 5/16".

Next consideration is the tail moment arm length, the distance from the center of the wing to the center of the tail surfaces. This is given as 50% of the span = 10 1/2". For longitudinal stability the stabilizer must have the proper area for this moment arm. Its span = 40% of the wingspan, or 8.4". Its chord should be 85% of the wing chord or 2.55". The fin chord is customarily the same as the stabilizer = 85% C = 2.55". The fin height = 43% of the stabilizer span = 3 5/8".

These values are based on the assumption that stabilizer and fin tips are curved similar to the wings as shown in Fig. 80. Area allowances are made for the cut-away tips.

The nose length is determined next. This should be 25% to 30% of the wing span for models with landing gears. If longer than this stability will be impaired; if it is shorter too much weight will have to be added to the nose to give proper flight balance. This would make the model unnecessarily heavy, impairing efficiency. A value of 5 11/16" is selected, as this will allow the use of a motor stick exactly 18" long.

The flight efficiency of any model is largely determined by the propeller. Diameter has the greatest effect and should be 33% to 50% of the wingspan, varying with the purpose for which the model is designed. For average experimental types 38% to 40% proves excellent, so a diameter of 8" is chosen.

Propeller pitch is the next consideration. This is not the angle of the blade as many suppose, but the distance the propeller will screw itself forward through the air in one revolution. The standard and most efficient pitch value is 1 1/2 times the diameter = 12". This is convenient also from a construction standpoint, for a propeller cut from a block whose depth is 1/2 the width will give the proper pitch.

This ratio of depth to width relative to the diameter determines the propeller's weight, shape and area. To obtain proper area for climb and efficiency the depth should equal about (0.094) times the diameter; in this case approximately 3/4". The block width therefore = 1 1/2".

The next consideration is the general setting and position of the parts. To give longitudinal stability there must be a longitudinal dihedral of about 2 degrees. An average convenient setting of the stabilizer is zero degrees; that is, it is parallel with the thrust line or propeller shaft. Consequently the wing will be set at plus 2 degrees, which angle is provided by the elevation block shown in Fig. 80.

To give lateral stability, lateral dihedral is necessary. An average value is 3/4" per ft. of span; however this contest model should lean to the side of stability, so a value of 1" per ft. of span is selected. To give the model proper balance with the lightest possible landing gear this latter part should be attached to the frame well forward, close to the propeller keeping the propeller from striking the ground and possibly breaking.

For efficiency the frame to which all of these parts are fastened and which keeps them in their proper relative positions should be very simple. Any unnecessary complications mean added weight, resistance and loss of efficiency, so a simple single stick is used. Fig. 80 gives a perspective view of the plane as it will appear when completely assembled with all its auxiliary parts required for efficient operation.

In the next issue of MODEL AIRPLANE NEWS complete plans and directions for building the little ship will appear.

VICTORY

De Havilland Mosquito

(Continued from page 23)

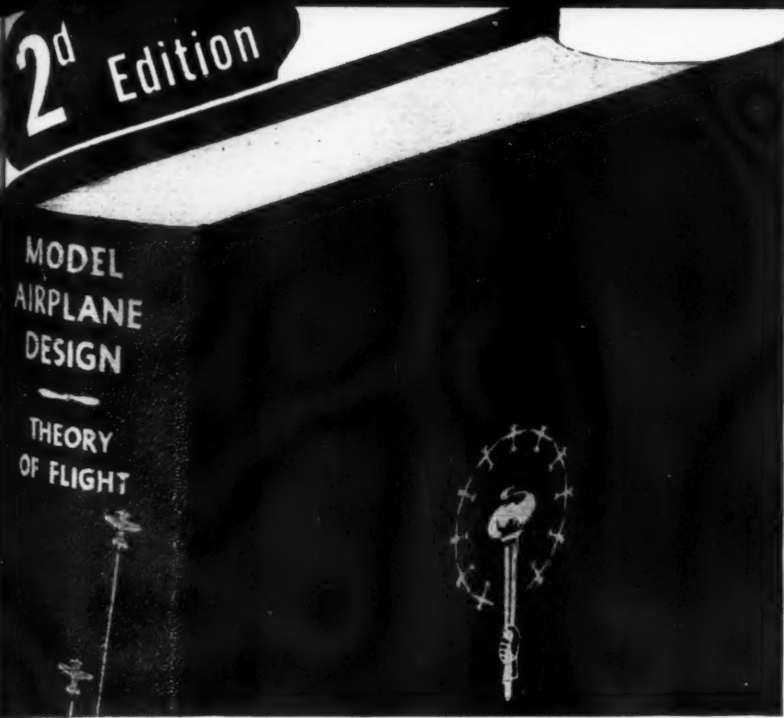
ment. Wings and tail surfaces are built in a somewhat similar manner in that the outer shell is pre-formed prior to attachment to the ribs-stringers-spar structure.

Engine supports and cowling, landing gear, main structural fittings and armor plate are the only metal parts used in the plane. Wing surfaces are covered with coat-after-coat of high-gloss lacquer, highly waxed and polished. On the plane surfaces we examined you could actually blow lint off!

The plane sits quite low to the ground with the exception of two huge propeller spinners, easily the largest ever installed, protruding forward of the craft and characterizing the entire assembly. The nose barely projects beyond the spinners and is a moulded phenol plastic with a clear-vision flat panel at a large angle for use of bomb-sighting mechanism. Two large observation windows are located just aft of the nose cone on either side of the ship. The crew's enclosure is beautifully faired into the fuselage, mounted atop and well forward, providing excellent vision particularly with the airplane's nose sloping downward and forward. Bomb-bay doors are beneath the ship almost directly below the crew's quarters, the latter separated from the bay by a solid flooring. A small door in the bottom of the fuselage between bomb-bay doors and nose cone provides ingress and egress for the crew. These are the only openings in the entire fuselage with the exception of that for the tail wheel. The entire fuselage is very sleekly finished as described previously.

The Mosquito has been popularly compared with the famed De Havilland Comet which flew in the London-to-Melbourne MacRobertson Race in 1934, piloted by C.W.A. Scott and T. Campbell-Black. This sleek racer carried 258 gallons of gasoline and had a top speed of 230 mph. on two D.H. Gypsy Six R engines of only 230 hp. each. The Comet had a wing span of 44 feet and was 29 feet long. The comparison has most probably been made due to the similarity of the wing and tail planforms but this distinctive feature has marked all De Havilland products and has given them their racy appearance, even in the case of slow trainer types.

Power is supplied by two Rolls-Royce



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Merlin engines. This engine is fitted with England's first two-stage, two-speed gear-driven supercharger which they erroneously claim as being the first in the world but which has been in use in this country for more than two years. This device simply consists of two blowers one of which has a two-speed gear-shift. Principal difference between British and American versions is the location of the intercooler between blowers and carburetor in the Rolls-Royce and its location between the blowers in the American version installed on the Pratt & Whitney R-2800 engine. (The latter develops nearly twice the horsepower of the former, although of considerably more displacement.)

The engines are located outboard of the fuselage in the wing leading edge and are completely enclosed in removable fairing panels. Engines are mounted on steel welded mounts ahead and below the wing in such a manner that the top of the nacelle and the wing panel are completely flush. Three-bladed all-metal constant speed De Havilland (Hamilton-Standard license) propellers are fitted.

A distinguishing feature of the Mosquito is the projecting leading edge of the wing inboard of the engine nacelles which lies at right angles to the fuselage reference line whereas the wing outboard sweeps rearward in a pronounced taper. The inboard leading edge is actually an air intake from which ducts conduct the air to the oil cooler and intercoolers mounted in the wing contour. Small controllable flaps are located in the lower surface of the inner wing section to control the quantity of air passing through the oil cooler and thereby controlling oil and engine temperatures. The liquid-coolant radiators are mounted between the oil coolers and are provided with similar controls. A small intake duct under the engine cowling delivers air to the carburetor.

The landing gear is conventional tractor type with main wheels supported by double shock-struts on either side of the axle. The gear folds rearward and upward into the engine nacelle after-section by hydraulic control. They are completely enclosed by large clam-shell doors which ride on guard braces fitted to the struts. The tail wheel is also retractable into the rear end of the fuselage but has no covering door.

The Mosquito's internal arrangement can be modified into several different combinations but the version examined was fitted for a two-man complement normally acting as pilot and co-pilot in a side-by-side seating arrangement in the enclosure.

Complete communications equipment is installed with the co-pilot acting as radio operator. An antenna mast is located atop the fuselage just aft of the enclosure.

The version examined was not fitted with armament of any kind and it was stated that the Mosquito relies entirely on its speed and the element of surprise to escape damage from enemy fighters. British sources have stated that "four 20 millimeter cannon and four 0.303 guns may be installed."

The Mosquito has a wing span of 54 ft. 2 in., is 40 ft. 9-1/2 in. total length overall. It stands 15 ft. 3 in. in height and has a wing area of 420 sq. ft.

Its normal complement of bombs is four 500-pound types carried internally.

Reference has been made in the British press to the Mosquito as being a 400-mile-per-hour light bomber and, while this seems extremely optimistic, the appearance of the airplane altogether lends credence to this statement. It is undoubtedly very light in weight and with its high horsepower and extremely low parasitic drag, might achieve this figure in the lightly loaded condition. Certainly it is one of the fastest bomber-types now in use and perhaps the fastest ever built. It is extremely maneuverable and Captain Geoffrey G. De Havilland and Mr. C. C. Walker, the firm's chief designer, have both handled the ship and praised this feature.

The Mosquito is being built both in England in the "shadow" plants and by the De Havilland Company of Canada in huge quantities. Few airplanes have been announced in such a startling manner as was the Mosquito and should it continue its present pace, De Havilland's first military plane of World War II may become the war's most outstanding airplane and gain still further achievement for its designer and builder as did the first World War. Certainly it will do valiant work in this war and play its role in the destruction of enemies of free men everywhere.

VICTORY

Aviation Advisory Board

(Continued from page 29)

from the sheet equal in area to about 55% to 60% of the total sheet area. In other words, on a balsa wing the cutouts can be made between the front and center spars, and rear spars, allowing strips along the length parallel with the chord to act as ribs. This cutout area can be made more than half the total weight if desired. Then the wing formed from cut out sheet may be covered with tissue paper.

This is an excellent way of building simple hardwood wings that will retain their shape in a manner similar to balsa sheet wings. In this issue of Model Airplane News an example of this type of construction appears, applied to a basic simple beginner's stick model.

Another important query from Mr. Phinney is:

Question: What kind of glue is necessary for these harder woods?

Answer: This depends entirely upon the stress per unit of area imposed upon any joint. Naturally quick-drying nitro-cellulose cement, such as used commonly with kits, cannot be used for butt-joints occurring in the fuselage between struts and longerons. Here very small gluing area is possible and the joint will be much weaker than the members. In such instances gusset plates covering two sides of the joints will provide the required strength if the nitrocellulose glue is used, for the joint-glued area then can be increased by at least 6 times with corresponding increase in strength. This type of construction is sug-

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gested wherever nitro-cellulose cement is used and is preferable to using other varieties of glue because of the quick-drying quality.

Another glue which may be used is casine glue;; however this must be prepared with water and be boiled. It is then applied to the joint which is clamped until the glue dries thoroughly; requiring about 12 hours. In some cases this added time for drying may not be inconvenient and then its use is advisable. It is completely waterproof and will stand up under exceptional stress.

The use of ordinary flake and granular glue is not advisable, even though it is of the variety which requires boiling. Ordinary prepared liquid glues should not even be considered, for changes in temperature or moisture content of the air soften these glues or harden them so they become brittle and chip.

Mr. Phinney suggests that added diagonals between panels may give greater strength to many structures.

Usually this is not suitable as most structures are too strong; that is, too strong in one place and too weak in another and, of course, they are only as strong as the weakest point, consequently it has excessive weight. This brings the situation down to stress analysis and the knowledge of where stresses occur and how great they are.

Diagonals can be used to excellent advantage by cutting down the size of all longerons and putting diagonals at the points where the great stresses exist. Namely, from points of landing gear attachments to motor and wing mounts. The origin of greatest stress in any model fuselage lies in the triangle between the motor, landing gear and wing. The most intense stress occurs in the wing spars at their center.

Question: What are the limitations of cardboard now frequently used for bulkheads, wing ribs, wing tips and general outline work?

Answer: Cardboard has been tried with excellent effect as a substitute for certain parts of the structure and serves well when used for bulkheads, ribs and irregularly shaped parts. In itself it is heavy but it is comparatively strong in all directions, having no particular grain and therefore irregularly shaped parts can be cut out at the center without weakening them. In this way weight may be reduced.

These are a few brief important considerations on hardwood construction. However readers of MODEL AIRPLANE NEWS can look forward to more complete, helpful and regular articles on this subject in future issues.

Albert Hedrick of 2733 Poplar St., Philadelphia, has some questions regarding outdoor rubber-powered, single pusher models.

Question: What should the overall body length be for a 40" wing? What is the best value for the moment arm?

Answer: The frame length should equal the wing span. The small front plane should be placed about 2" from the nose; the center of the rear wing 8" from the rear.

Question: What amount of dihedral should be used in each wing?

Answer: In the rear wing 1/2" per foot of span is sufficient; for 40" this would be 1 11/16" on each wing tip. The dihedral on the front wing should be 25 degrees of each half-wing, or a dihedral on each tip of 3/8" per inch of span, approximately.

Question: Should the wing be mounted low or high on the fuselage or a wing pylon?

Answer: The rear wing should be mounted on a motor stick or slightly below. The small front wing should be raised well above the stick, its center raised a distance equal to 1/4 the span. When raised in this manner the dihedral should be only 18 to 20 degrees of each wing-half.

(Continued on page 64)

Flash News

(Continued from page 2)

North Africa, who was recently decorated for gallantry in action, is too big to wear a parachute in the tiny cockpit of his plane and frequently makes flights over enemy territory without one!

Another North Carolina-class 41,000 ton battleship has joined the fleet and may soon be in action in the Pacific. Bristling with the greatest array of anti-aircraft firepower yet installed, this mighty dreadnaught may serve to bring back seapower's case in the bitterly fought debate with airpower. A sister ship shot down 35 Japanese fighters and bombers in a single day during repeated heavy attacks in the South Seas. These ships, in addition to heavy protective deck armor, carry 10 secondary battery gun platforms, each mounting twin 5-inch guns and a large number of the new and highly effective 20 millimeter A-A guns mounted in pairs.

General Douglas MacArthur, only four-star officer in the Army, who was one of the members of the court-martial that "broke" General William Mitchel, has been converted to airpower through a baptism of fire. After his successful campaign in Papua during which 15,000 Jap soldiers and their leader, General Tomatore Horii, were slain in the bitterly contested Buna and Gona areas, MacArthur stated: "The outstanding military lesson of this campaign was the continuous cal-

culated application of airpower, inherent in the potentialities of every component of the air forces, employed in the most intimate tactical and logistical union with ground troops. For months on end air transport with constant fighter coverage moved complete infantry regiments and artillery battalions across almost impenetrable mountains and jungles of Papua and the reaches of the sea, transported field hospitals and other base installations of the front and supplied troops and evacuated casualties." Certainly the conversion of this high-ranking military figure is a major victory for airpower and may well be the opening breach in the "stone-wall of land-thinking generals." In conclusion, General MacArthur summed up the case for Air Power in his masterful rhetoric: "The offensive and defensive power of the air and the adaptability, range and capacity of its transport in an effective combination with ground forces, represent tactical and strategical elements of a broadened conception of warfare that will permit the application of offensive power in swift, massive strokes rather than the dilatory and costly island-to-island advance that some have assumed to be necessary in a theater where the enemy's far-flung strongholds are dispersed throughout a vast expanse of archipelagoes."

Vought Aircraft and Sikorsky Aircraft have been reinstated as separated divisions of United Aircraft Corporation following their combination into the "Vought-Sikorsky Division" in 1939. Purpose of the move is to permit Igor I. Sikorsky to continue experiments and development of his successful helicopter design and to allow Vought to concentrate on the production of Navy combat planes.

After a deserved retirement, United Airlines famed old Boeing 247 twin-engine transports are now back in service. Army requisitions of newer type transport planes from factories before their completion has made it necessary to reinstate these venerable old "work horses." The Boeing 247 gained fame as the world's first full cantilever all-metal twin-engine airliner and set the style which has not yet been altered. Their "easy riding" is still a favorite of many veteran pilots.

With a total of 26,000 planes and pilots registered and drilled, the Civil Air Patrol has announced its readiness to assist the Army in maintaining constant coast aerial patrol designed to warn of such an attack as took Pearl Harbor by surprise. Although no definite announcement has come from the Army, this move would mean release of thousands of earth-bound private planes grounded by Army orders in restricted areas.

Simultaneously with the announcement that it would be released by the War Department to civilian airlines, came first preliminary facts and figures concerning the mysterious Lockheed "Constellation" four-engine airliner. The huge ship features a pressurized cabin and a top speed of 350 m.p.h. It will operate at altitudes as high as 30,000 ft. and cruise for a distance of 4,000 miles.

The giant ships will cost $500,000 each and will bring New York and Los Angeles closer by several hours, the trip being

anticipated in just 8 hours and 30 minutes; Buenos Aires will be only 28 hours from New York City. The ship is powered by four Wright Cyclone 18-cylinder double-row engines and will go into service with T.W.A. immediately after completion of flight tests.

In response to a barrage of criticism, War Production Chief Donald M. Nelson has awarded the aviation industry an equal priority rating with that held for some time by ship and tank manufacturers. Long working under an A-1-D rating while other national defense firms enjoyed A-1-A priority ratings for the purchase of raw materials, the aviation industry is now free to hit the stride it has so long been promising and which it so badly needs to play the part in this war of which it is capable.

Lockheed and Vega Aircraft Corporation employees have started a "Buck-a-Month" club, which involves the contribution of $1.00 per month by each member, who receives a membership card and pin, funds to be contributed to wartime charities. Other aircraft factories are rapidly following suit.

Employees of Cessna Aircraft, Wichita, Kansas, published an "annual" that looks like a college yearbook with photographs of company clubs, teams and space for autographs. Other companies are considering such a volume, although the photographs of the more than 100,000 employees at the Lockheed and Consolidated Companies alone might well rival the Encyclopedia Britannica.

Add notes: Lloyd Stearman, pioneer aircraft designer and builder, is now in charge of aviation production for a small West Coast parts factory. Walter T. Varney, once head of the fast Varney Speed Lines, is now an inspector of warplanes on Lockheed's assembly lines. How many old timers do you know who are now "keeping their hand in" on a somewhat smaller scale?

Various ways and means in which the aviation industry is securing badly needed men for its production lines: Vultee Aircraft is experimenting with use of wood for some non-structural plane parts so that wood workers may be utilized and material shortages overcome; North American Aviation is employing many men whose hobbies have familiarized them with machine and tool production; Northrop Aircraft is turning to various research and educational establishments for new development engineers and experimental machine workers; Boeing Aircraft is interviewing workers in Detroit, orphans of the automobile misplacement industry to find specialists who can go to work in aircraft immediately; Consolidated Aircraft is interviewing 7,000 men a week and recently hired all the graduates of a short-term night school course in welding. Lockheed has established branch employment offices in 26 key cities in an effort to tap the nation's supply of skilled workers; Fleetwings, Inc. in Bristol, Pennsylvania, is employing all the workers of specific curtailed industries; Republic Aviation is hiring extensively with a reservoir of manpower from the automobile industry in the area when the supply is exhausted; Wright Aeronauticals is hiring machinists with a minimum of skill and experience. There's the line-up, prospects, go to it! "If you

can't fly: build!"

United Airlines received the National Safety Council's award for flying 300,000,000 miles without a fatality. United received the group A award for lines with more than one hundred million miles while Braniff Airways received the group B safety award in the ten million to one hundred million class.

Consolidated Aircraft Corporation, San Diego, California, now has in operation one of the world's largest altitude chamber laboratories capable of simulating rarified atmosphere and extreme cold existing up to 70,000 feet or 13 miles altitude. The equipment, supervised by Dr. H. M. Helmholz, formerly of the Mayo Foundation, will be used to study problems of flight in the stratosphere and to ascertain the effects of cold and thin air on bomber equipment. Temperatures inside the chamber will reach a maximum of 80 degrees below zero, 20 degrees colder than any chamber now in use. Twelve men at a time will be accomodated in the chamber and they will wear regulation heated flying suits and oxygen masks. Dr. Helmholz pointed out that "modern planes can fly at altitudes higher than pilots can endure without succumbing to aeroembolism, a mild form of the 'bends' experienced by deep sea divers, and altitude sickness. The present human ceiling is about 40,000 feet, which can only be withstood for 15 to 20 minutes."

Pan American Airways has recently celebrated its 15th anniversary which was participated in by its more than 20,000 employees. The firm began its operations on October 19th, 1927 with a 90-mile flight from Key West, Florida to Havana, Cuba. Since that date the giant airline has extended its mileage to more than 100,000 scheduled miles including its various subsidiaries: Pan-American-Grace Airlines, Aerovias Nacionales de Columbia, Pan American Pacific Service, Pan American Atlantic Service, Pan American Africa, China National Aviation Corporation (prior to Pearl Harbor), Panair do Brasil, Cia. Mexicana de Avacion, Cia. Nacional Cubana de Aviacion and Pan-American Air Ferries. This last mentioned was recently absorbed by the Army Air Forces Air Transport Command for the duration. To Pan-American Airways goes the credit for much of the pioneering work in long-range over-water airplane operation and the design and operation of long-range flying boats. In addition the firm laid out and established the many bases for the ATC's extensive South American and African delivery route across which large numbers of vitally needed transports and bombers have been delivered by air to the Middle East campaign.

A new Wright Aeronautical Corp. plant has been completed in New Jersey for the construction of high-powered engines. The plant utilized the new "warspeed" type of construction which comprises a cement spread covered by a structure made up of a composite material. This was then raised into the air and supported while the remainder of the plant was completed. Only four months and two weeks after ground-breaking ceremonies, production was under way!

All signs, markers and beacons must be removed from roofs of buildings except those beacons specifically approved by the War Department, it was recently announced. This new order will affect only the East and West Coasts but will necessitate the painting over of thousands of arrows, markers and even the digging up of stone and shrubbery markers. These arrows, pointing out the direction to the nearest airport, might easily be used by an attacking Japanese squadron.

Douglas Aircraft, in its annual report recently filed, states that the giant B-19 "Hemisphere Defender" cost a total of $2,643,988 to date with money still being expended on the project.

Ryan Aeronautical Company, in a similar report, states that it has been scheduled for the production of a "larger and more important" airplane for the Army Air Force. Design has passed the experimental development stage and is ready for production. No hint of its type or purpose was released.

The Mexican Air Force now has a native-produced and built primary training plane. Known as the Teziutlan, the craft is a low-wing monoplane with a fixed landing gear constructed completely from plywood with the exception of the engine mount and vital fittings. It is powered by a Lycoming engine and is said to be in quantity production to accelerate the Mexican Air Force's pilot training program.

According to reports, the Royal Air Force has been using four-ton "triple block buster" bombs in their raids on Turin, Italy. There are few bombers in the world capable of lifting 8,000 pounds, but reliable sources have stated that the Lancaster, Sterling and Halifax bombers of the Royal Air Force Bomber Command can carry two of these giant missiles of destruction for more than 1,000 miles, drop them and return to the base!

Major Alton N. Parker, first American to set foot on the Antarctic continent, died recently at his home in Kansas City. The TWA transport pilot accompanied Admiral Richard E. Byrd on his 1926 expedition to the North Pole and was chief test pilot in the 1928 South Pole expedition, at which time he became the first American to set foot on this vast Southern land. Admiral Byrd afforded Parker the honor of stepping from the plane first because he was the senior marine of the expedition.

What might easily have been a tragedy of international significance, possibly altering the course of the war, was averted by the skill of an Army Air Forces pilot of a Flying Fortress nicknamed "Rambling Wreck." Lieutenant-General Dwight D. Eisenhower and Sir Andrew B. Cunningham made a preliminary survey flight over Algiers to look over the military and political situation. On the return trip the Fortress ran into heavy weather and began to run short of fuel due to violent headwinds. At the base, the ceiling closed down to 40 feet and darkness overtook the runway. Chief of Staff Brig. General Gruenther frantically radioed the plane to turn back to another base but was unable to make contact. Due to the skillful pilotage of Lieutenant A. E. Aenchhacker, however, the giant plane was landed safely in total darkness on the tiny field.

Information on the latest type Spitfire fighter has been released by the British Ministry of Information. The new single-seater is powered with the more powerful Rolls-Royce Merlin 61, replacing the 45 and 46 previously used, mounts four-bladed propeller and a radiator beneath each wing. The nose of the craft is longer to accommodate the larger engine and the conventional stub exhaust stacks are now used, replacing the ejector type.

According to War Production head Donald M. Nelson, there will be no more expansion of factory construction for aircraft production unless "the world situation changes radically." Present schedules call for 125,000 airplanes annually beginning next year, which will have to be handled with existing facilities and those for which appropriations have already been made. There will positively be no new plant construction on either the Atlantic or Pacific Coast, a result of the move to re-locate all vital war industries in the mid-Western states.

VICTORY

Aviation Advisory Board

(Continued from page 60)

Question: Is there any formula for the stabilizer moment arm for a single pusher?

Answer: There is a complicated formula but the following rule serves all purposes.

The moment arm should be equal to approximately 3/4 the wing span; minimum, 1/2 the wing span and maximum equal to the wing span.

Planes can be made with various length moment arm. However if the moment arm is short it will be lacking in longitudinal stability; if exceedingly long the ship usually is fast and will not be a typical duration model because the wing will be small relative to its length.

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